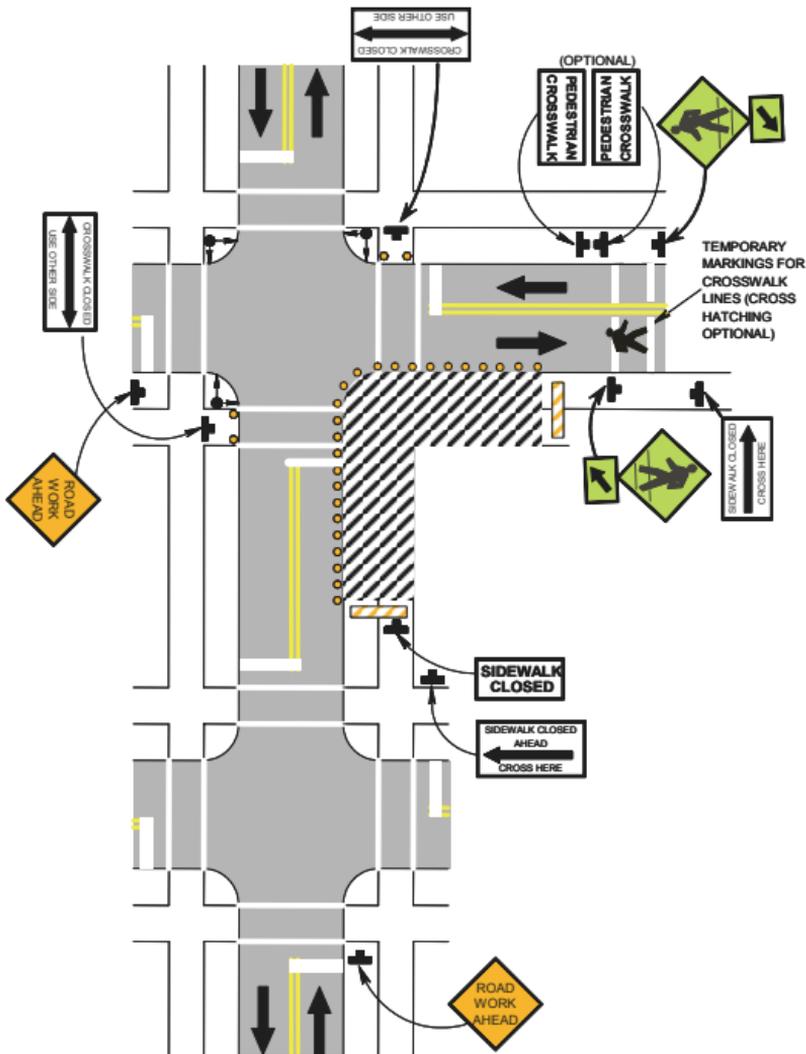




Guidelines and Standards for Temporary Traffic Control



Work Zone Safety

d.



Table of Contents

1.	Introduction.....	2
2.	Definitions.....	2
3.	Traffic Control Devices	4
	A. Signs	4
	B. Channelizing Devices.....	8
	C. Warning Lights	10
	D. Arrow Panels.....	11
	E. Pavement Markings.....	12
4.	Fundamental Principles.....	13
5.	Five Parts of a Work Area	14
6.	Taper Length Criteria for Work Zones	15
7.	Truck Mounted Attenuators	16
8.	Installing & Removing Lane Closures.....	16
	A. Installing Lane Closures.....	16
	B. Removing Lane Closures.....	17
9.	Mobile Operations	18
	A. Intermittent Mobile Operations	18
	B. Continuously Moving Mobile Operations.....	19
10.	Pedestrian & Worker Safety	20
	A. Pedestrian Considerations	20
	B. Worker Considerations.....	23
11.	Flagging Procedures	24
	A. Flagging Procedure Requirements	25
	B. Distance of Flagger Station in Advance of the Work Space.....	26
12.	Liability	26
13.	Daily Checklist for Temporary Traffic Control.....	28
14.	Typical Application Diagrams	29
15.	Legend for Typical Applications.....	30

1. Introduction

The goal of this Handbook is provide simple guidelines for work area traffic control and to supplement the DDOT's Work Area Traffic Control Manual and work zone safety training. This handbook deals with the basic requirements of Part VI of the Manual on Uniform Traffic Control Devices (MUTCD); with an emphasis on short-term work areas. These requirements apply to construction, maintenance, and utility work areas.

This handbook presents information and provides examples of typical traffic control applications for two-lane and multilane work areas. This information is intended to illustrate the principles of proper work zone traffic control, but is **not a standard**. Part VI of the latest version of the MUTCD and the DDOT Work Area Traffic Control Manual contain the standards for work area traffic control. All information shown represents minimum values – values are subject to approval by the engineer.

2. Definitions

The following are definitions for select terms used throughout these guidelines. Additional words and phrases are defined in the District of Columbia Department of Transportation *Work Area Traffic Control Manual* and shall be applicable when such definitions are not within this pocket guide. When used in the guidelines that follow, the terms below shall have the following meanings:

Shall – a mandatory condition

Should – an advisory condition

May – a permissive condition

Low Speed – a condition associated with a roadway on which the posted speed is less than 45 miles per hour.

Low Volume/Local – a condition associated with a roadway on which the average daily traffic (ADT) volume does not exceed 500 vehicles per day.

Peak Hours – The hours of 6:30 a.m. to 9:30 a.m. and 3:30 p.m. to 6:30 p.m., Monday through Friday, except holidays. “Off-peak hours” occur during those hours and days not identified as “peak hours.”

Mobile Operation – an operation that moves intermittently and will not occupy the immediate area for more than 5 minutes. The immediate area is defined as a 1000± linear foot distance.

Short Duration – an operation that occupies a location between 6 and 15 minutes.

Moderate Duration – an operation that occupies a location between 16 and 60 minutes.

Stationary – an operation that occupies a location for more than 60 minutes.

- Short-Term – Daytime work lasting between 1 and 12 hours
- Intermediate-Term – Work that occupies a location from overnight to 3 days
- Long-Term – Work that occupies a location for a period of greater than 3 days.

3. Traffic Control Devices

The following are several basic types of traffic control devices typically used in work area traffic control:

- Signs
- Channelizing Devices
- Lighting Devices
- Arrow Panels
- Pavement Markings

A. Signs

Signs used in work area traffic control are classified as regulatory, guide, and warning. These signs shall not be obstructed in any way by orange flags or flashing lights and shall be inspected routinely for the cleanliness, visibility, and the appropriate positioning.

Placement – Signs should be placed on the right side of the roadway, unless otherwise specified by the latest MUTCD guidelines.

Mounting – Standards for height & clearance are included in Part VI of the latest version of the MUTCD. In business, commercial, and residential areas, the bottom of the sign shall be at least seven feet from the top of the traveled way. Signs mounted on barricades or other portable supports shall be at least 1 foot from the top of the traveled way. All sign mountings and supports (including barricades) shall be crashworthy.

Illumination & Reflectorization – All signs used at night shall be either retroreflective or illuminated to show the same shape and similar color both day and night.

Removal – When operations have ceased or conditions have changed so that the existing temporary traffic control signs are no longer needed, the signs associated with the work area operation shall be promptly removed from the roadway.

Regulatory Signs

Regulatory signs inform travelers of traffic laws or regulations and shall not be used unless authorized by DDOT. Typical Regulatory Signs are:

- Rectangular
- Black Border & Legend
- White Background
- **Exceptions:** STOP, YIELD, DO NOT ENTER, WRONG WAY, ONE WAY



Warning Signs

Warning signs used to provide information to travelers during construction and maintenance activities in or adjacent to the roadway. Typical Warning Signs characteristics are:

- Diamond-shaped
- Black symbol or message
- Orange background, (also yellow & fluorescent yellow-green)



Size - The standard size of signs is typically 48" by 48". In cases where Right of Way is limited or geometric conditions do not permit the standard size, 36" by 36" signs may be used.

Spacing – The spacing of signs should be:

Spacing of Advanced Warning Signs			
Speed (MPH)	Minimum Sign Spacing (ft)*		
	A	B	C
25	150	150	200
30	200	200	200
35	250	250	350
40	300	350	500
45	350	500	750
50	500	750	1000
55	500	750	1000

* See Typical Applications for locations of A, B, & C

Guide Signs

Guide signs provide travelers with information to help them make their way through a temporary traffic control zone. If additional guide signs beyond those existing are used in they shall have the following characteristics:

- Black Legend
- Orange Background



The following Guide Signs should be used in work zones as needed:

- Standard route markings, where temporary routed changes are needed
- Directional signs and street names
- Special guide signs related to roadway conditions

Portable Changeable Message Signs

The primary purpose of Portable Changeable Message Signs in temporary traffic control zones is to advise the road user of unexpected situations. Some typical applications include the following:

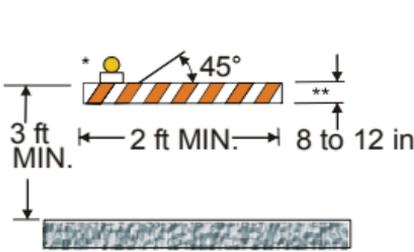
- Where the speed of motor vehicle traffic is expected to drop substantially;
- Where significant queuing and delays are expected;
- Where adverse environmental conditions are present;
- Where there are changes in alignment or surface conditions;
- Where advance notice of ramp, lane, or roadway closures is needed;
- Where crash or incident management is needed;
- Where changes in road user pattern occur.

Portable Changeable Message Signs may be used to supplement other signs, but not to substitute for any required signs. They may display a variety of messages and displays, but are typically used to display “real-time” or changing conditions information.

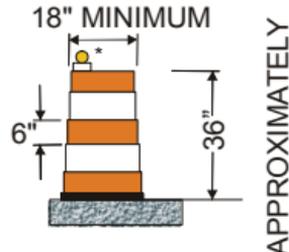
The Changeable Message Sign should not display more than three messages or displays, and the entire message should be readable twice at the usual roadway speed limit.

B. Channelizing Devices

Channelizing devices are used to warn and alert motorists of hazards in work zones, to protect workers, and to guide and direct drivers and pedestrians safely. Channelizing devices include barricades, drums, vertical panels, cones, tubular markers, drums, and portable barriers.

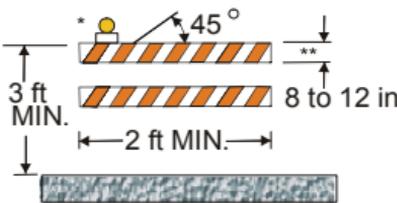


TYPE I BARRICADE ***

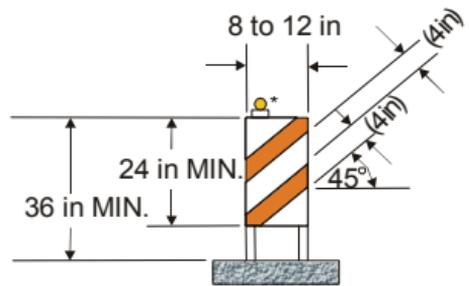


DRUM

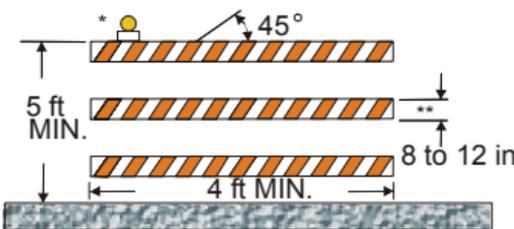
APPROXIMATELY



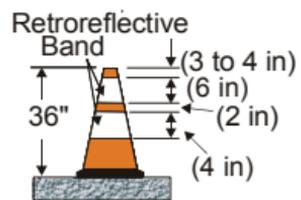
TYPE II BARRICADE ***



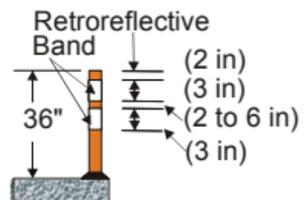
VERTICAL PANELS ***



TYPE III BARRICADE ***



CONES



TUBULAR MARKERS

*Warning lights (optional)

**Normal lumber dimensions are satisfactory for barricade rail width dimensions.

***Rail stripe widths shall be 6 inches, except that 4 inch wide stripes may be used if rail lengths are less than 36 inches.

The sides of barricades facing traffic shall have retroreflective rail faces

Appropriate Usage of Channelizing Devices

Barricades are used to mark a specific hazard or channelize pedestrian traffic (Type I and Type II) or to close a street for an extended period of time (Type III). Drums are most commonly used to channelize traffic flow in situations where they will remain in place for a prolonged period of time, but may also be used to mark a specific location. Vertical Panels are also used for channelization and serve as an alternative to cones, especially in darkness. They may also be used to delineate portable concrete barriers installed in freeway work zones (mounted to the top of the barrier).

Cones are used most commonly for short duration and short term work zone operations to channelized traffic in areas of local traffic only. Tubular markers are used for channelization or to divide opposing lanes where space is limited, except on high-speed segments of freeways or highways.

Portable barriers are used to prevent vehicles from leaving the travelway and to protect workers and pedestrians from errant vehicles.

Spacing of Channelizing Devices

Channelizing Device Spacing		
Work Zone Location	Posted Speed Limit	Spacing
Low-Speed Road	20 mph or less	10'
In Transitions and Curves	35 mph or less	20'
Parallel to the Travelway	35 mph or less	40'
Spot Construction Access*	35 mph or less	80'
In Transitions and Curves	Greater than 35 mph	40'
Parallel to the Travelway	Greater than 35 mph	80'
Spot Construction Access*	Greater than 35 mph	120'

*For easier access by construction vehicles into the work area, spacing may be increased to this distance, but shall not exceed one access per quarter mile.

Channelizing devices should be spaced so that they make it apparent that the roadway, sidewalk, or work area is closed to traffic. To accomplish this, the devices should be spaced based on the posted speed and by the following guidelines:

C. Warning Lights

Warning Lights are portable, lens-directed enclosed lights of seven inch diameter which emit yellow light and operate either in flashing or steady burn mode. Warning lights may supplement retro-reflectorization on warning and channelizing devices. The principal types and uses of warning lights are:

Low Intensity Flashing Lights (Type A)

Commonly mounted on advance warning signs, Type II barricades, vertical panels, or on independent supports, they are used to warn of an isolated hazard at night.

High Intensity Flashing Lights (Type B)

Normally mounted on advance warning signs or high level warning devices, they are used to draw attention to a hazard both day and night.

Low Intensity Steady-Burn Lights (Type C)

Mounted on vertical panels and on all barricades, they are used in a series to delineate the edge of the lane and channelize traffic at night. Type C Steady Burn Lights shall be used on all channelizing devices for guiding traffic, forming tapers, delineating center lines, lane lines, and the edge of the traveled way.

D. Arrow Panels

Arrow Panels are required for lane closures on major arterials and may be deemed necessary on other roadways.

Flashing Arrow



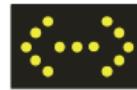
Sequential Arrow



Sequential Chevron



Flashing Double Arrow



Flashing Caution



Arrow Panels		
Type	Minimum Size	Minimum Lamps
A	24' x 48'	12
B	30' x 60'	13
C	48' x 96'	15

E. Pavement Markings

For long-term stationary projects, follow the guidelines of Part VI of the MUTCD in placing and removing pavement markings. The colors of temporary pavement markings and delineators follow the same standard as for permanent markings. When used to enhance the visibility of the roadway edge, white is specified along both sides of two-way roadways and the right side of one-way roadways. Centerlines and lane lines are yellow when separating opposing directions of traffic and white lines used when separating lanes going the same direction.

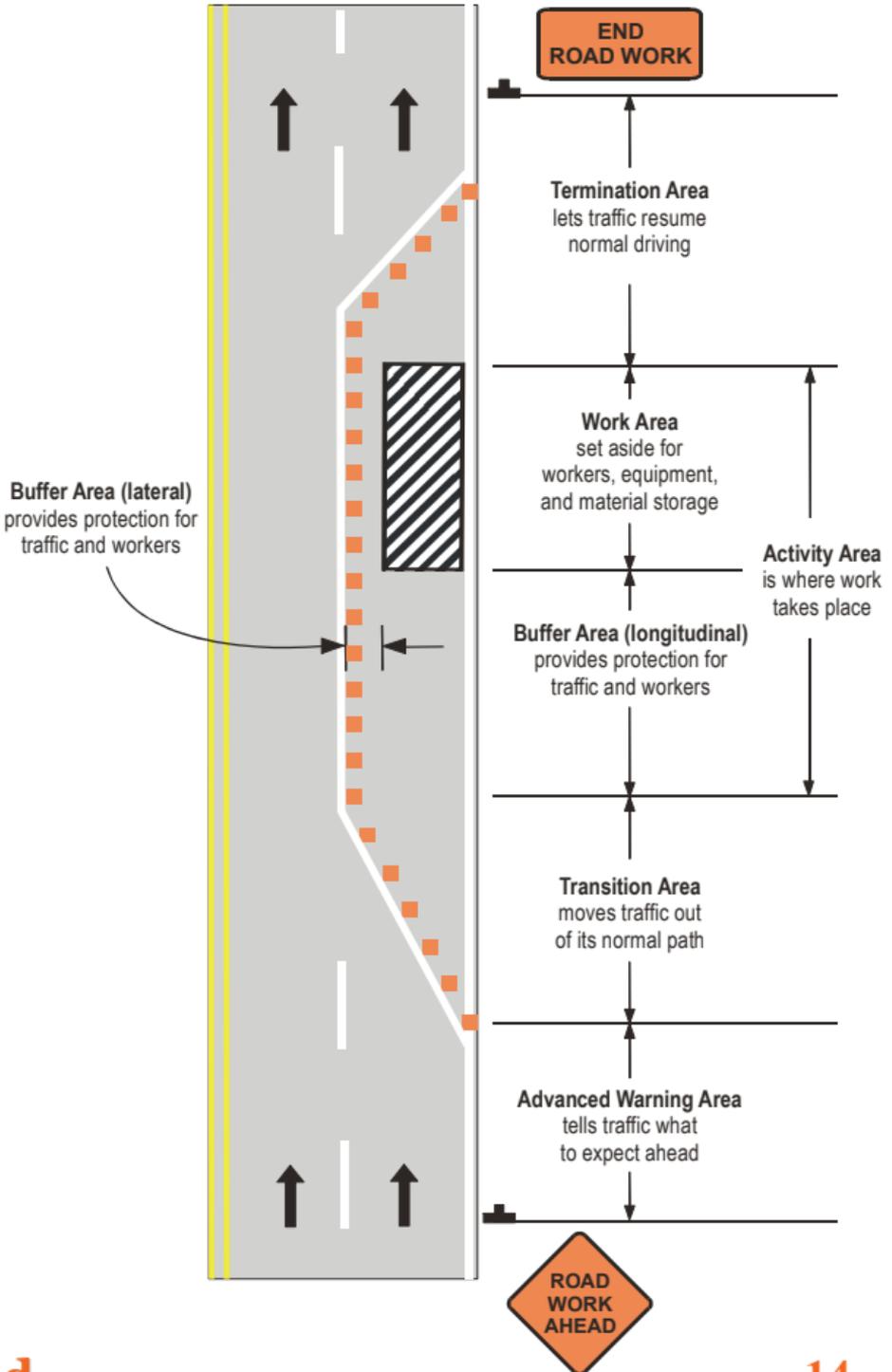
Where existing pavement markings conflict with the temporary travel path, additional signing and channelizing devices are appropriate.

4. Fundamental Principles

- Traveler movement should be inhibited as little as possible.
- Travelers should receive clear and positive guidance throughout the entire work zone.
- Daily inspections of work zones should be performed to ensure safe conditions.
- Considerable attention should be given to roadside safety for the duration of the work area operation.
- Safety in work areas should be a high-priority throughout the entire operation.
- Adequate provisions shall be made for transit and taxi access when appropriate.
- Frequent and abrupt changes in the travelway should be avoided.
- Bicyclists and pedestrians (including the disabled) should have appropriate access and safe passage through work zones.
- Roadside recovery areas / clear zones, free of vehicles and equipment, shall be provided where possible.
- All work area personnel shall be appropriately trained for their responsibilities.
- The public should be kept well informed.

5. Five Parts of a Work Area

A typical work area is the distance between the first and last temporary traffic controls. This area consists of the Advanced Warning Area, Transition Area, Buffer Area, Work Space, and Termination Area. The following diagram shows these five areas.



6. Taper Length Criteria for Work Zones

Tapers are used to gradually move traffic into and out of the normal travelway. They consist of a series of channelizing devices or pavement markings. The following are five types of tapers with varying lengths based on speed and lane width.

Type Of Taper		
Merging Taper	Number of Lanes is reduced	L minimum
Shifting Taper	Lateral shift, no lane reduction	$\frac{1}{2} L$ minimum
Shoulder Taper	Shoulder closed	$\frac{1}{3} L$ minimum
Two-way Traffic Taper	Opposing directions	50 feet min 100 feet max
Downstream Taper	End of work area	100 feet/lane max

Formulas for Taper Length (L)	
Speed Limit	Formula
40 mph or less	$L = \frac{WS^2}{60}$
45 mph or greater	$L = W \times S$

Note: L = Length of Taper (ft), W = Width of Lane or Taper (ft), and S = Speed (mph)

Taper Lengths (L)					
Speed Limit (mph)	Width of offset (Ft)				Max Distance between devices (Ft)
	9	10	11	12	
25	95	105	115	125	25
30	135	150	165	180	30
35	185	205	225	245	35
40	240	270	295	320	40
45	405	450	495	540	45
50	450	500	550	600	50
55	495	550	605	660	55

7. Truck Mounted Attenuators

A Truck Mounted Attenuator (TMA) vehicle is required in all lane and/or partial ramp closures on four or more lane roadways when the posted speed limit is 45 mph or greater, and for mobile operations which fully or partially block a lane. The TMA may also be required in other situations where DDOT staff feel such protection is warranted. Placement of the TMA vehicle shall be 50 – 100 feet in front of the first work crew, equipment, or hazards that traveling motorists would encounter. Each TMA vehicle shall have at least one rotating amber light or high intensity amber strobe light functioning while in operation.

8. Installing & Removing Lane Closures

Care must be exercised when installing and removing lane closures. All stationary lane closures begin and end as mobile operations. The traffic control needed to perform the operation safely is dictated by the location on the roadway where the mobile operation will occur; either on the shoulder or partially or fully in the lane.

A. Installing Lane Closures

Stationary lane closures should be installed with the flow of traffic in the following sequence:

1. Install all advance warning signs.
2. Place arrow panel in the shoulder at the beginning of the merging taper.
3. Place channelizing devices to form a merging taper.
4. Install the buffer space.
5. Continue placing channelizing devices through the work area at the correct spacing.

6. Install an “END ROAD WORK” sign no less than 200 feet and no more than 500 feet beyond the last device in the lane closure.
7. Place a TMA vehicle, if required, 50-100 feet from the first work crew or hazard approached by motorists.

A “ride through” check should be performed along the entire length of the lane closure (with adjustments made to any traffic control devices, as needed) to ensure that the lane closure is properly installed and functionally acceptably.

B. Removing Lane Closures

Station lane closure should be removed against the flow of traffic in the following sequence:

1. Remove channelizing devices from the end of the closure back to the widest part of the merging taper.
2. Place the removal vehicle on shoulder and remove devices from taper by hand onto the backing vehicle.
3. Remove the arrow panel after ensuring that the roadway is clear.
4. Moving with the flow of traffic, remove all the advance warning signs, beginning with the “ROAD WORK AHEAD” sign and ending with the “END ROAD WORK” sign.

9. Mobile Operations

Mobile operations are work activities that move along the road either intermittently or continuously. Safety for mobile operations should not be compromised by using fewer devices simply because the operation will frequently change its location.

Portable devices should be used. For example, appropriately colored and marked vehicles with flashing or rotating lights, perhaps augmented with signs or arrow displays, may be used in place of signs and channelizing devices.

For mobile operations to be successful, the advance warning area for these operations must move with the work area or be repositioned periodically to provide advanced warning for the motorist.

A. Intermittent Mobile Operations

Intermittent mobile operations often involve frequent short stops, each as much as 15 minutes long for activities such as litter cleanup, pothole patching, or utility operations and are similar to stationary operations. Warning signs, flashing vehicle lights, and/or channelizing devices should be used.

With operations that move slowly (less than 3 MPH) it may be feasible to use stationary signing that is periodically retrieved and repositioned in the advance warning area. In addition, vehicles may be equipped with such devices as flashing vehicle lights, truck mounted attenuators, and appropriate signs.

Flaggers may be used, but caution must be exercised so they are not exposed to unnecessary hazards.

B. Continuously Moving Mobile Operations

Continuously moving mobile operations include work activities in which workers and equipment move along the road without stopping, (e.g. pavement striping, mowing, street sweeping, or herbicide spraying), usually at slow speeds.

For some continuously moving operations where volumes are light and visibility is good, a well-marked and well-signed vehicle may suffice. If volumes and/or speeds are higher, a shadow or protection vehicles, equipped as a sign truck, should follow the work vehicle. The advance warning area moves with the work area.

10. Pedestrian & Worker Safety

A. Pedestrian Considerations

When pedestrian pathways are closed or disrupted due to construction, maintenance, or utility work, pedestrian traffic controls are required. These controls include signs, channelizing devices, flags, etc. to direct pedestrians through or around the work site.

Some major considerations in planning for pedestrian safety in work zones include:

- Pedestrians should not be led into conflicts with work site vehicles, equipment, and operations.
- Pedestrians should not be led into conflicts with work site vehicles moving through or around the work site.
- Pedestrians should be provided with a safe, convenient path that replicates as nearly as practical the most desirable characteristics of the existing sidewalk(s).
- Covered walkways should be provided when pedestrians are exposed to potential injury from falling objects.
- Advanced notification of sidewalk closures shall be provided.
- Adequate provisions shall be made for persons with disabilities.
- Access to businesses, residences, and crosswalks must be maintained. Adverse economic consequences to businesses within the work zone area should be avoided by maintaining proper access.

Pedestrian Accommodation Checklist

The following items must be considered in the Traffic Control Plan (TCP):

- Impact on pedestrian generators (Schools, Senior Centers, transit stops, etc.)
- Impact on existing pedestrian flow
- Pedestrian information needs – advance, transition, work area, and exit information
- Pedestrian Facilities – walkway width, surface, boundaries, transitions, and channelization
- Intersections – crosswalk placement, additional signing/markings, traffic signals modification (timing, pedestrian signals, push button, etc.)
- Adequate pedestrian protection – physical separation from work space and vehicular traffic, overhead protection, etc.
- Construction staging to maintain pedestrian access throughout all construction phases
- Temporary nighttime lighting
- Requirements of the Americans with Disabilities Act (ADA) of 1990
- Location/access to business, residences, etc.
- Future Considerations – frequent checks of the pedestrian accommodations during construction to ensure that the temporary Traffic Control Plan (TCP) is followed, traffic control devices are maintained in good condition, and a safe, accessible pedestrian route is available at all times.

Covered Walkways

- The structural design and construction of covered pedestrian pathways shall be approved by DDOT.
- Covered walkways shall be sturdily constructed and adequately lighted for nighttime use with vandal-resistant fixtures mounted on 30-foot centers near the roof line.
- Under no circumstance shall trailers, work equipment, or any other objects associated with work zone operations be placed on top of the roof of the covered walkway.
- Minimum requirements for the floor and roof shall be 300 pounds per square foot. The walking surface shall be paved or covered with plywood or wood planking.
- The overhead clearance shall be at least eight feet (8 ft.) high. Temporary covered ways shall afford a free passage of at least six feet (6 ft.) in width.
- Continuous handrail shall be installed along the walls of the covered walkway to aid pedestrians with usual and ambulatory difficulties.
- Adequate provisions shall be made for persons with disabilities, including wheelchair ramps.
- Covered pedestrian pathways shall be provided with corner treatments which allow a minimum 45 feet sight distance triangle.

B. Worker Considerations

The safety of workers is equally as important as the safety of travelers through the work zone. All workers should be trained on how to work near motor vehicle traffic in a way that minimizes their vulnerability. Based on their roles and responsibilities, workers should be trained in temporary traffic control techniques, device usage, and replacement.

Temporary traffic barriers should be placed along the work space based on lateral clearance of workers from adjacent traffic, traffic speeds, the type and duration of the operations, time of day, and volume of traffic.

For daytime work, workers exposed to traffic should be attired in a vest, shirt, or jacket that shall either be orange, yellow, yellow-green, or a fluorescent version of these colors.

Other specific agency requirements for garments may also apply.

For nighttime work, similar outside garments shall be retroreflective; either being orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at a minimum of 1000 ft.

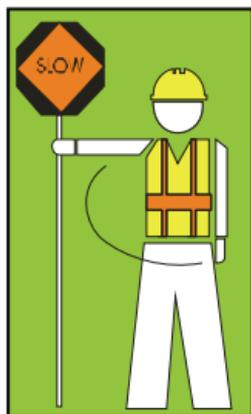
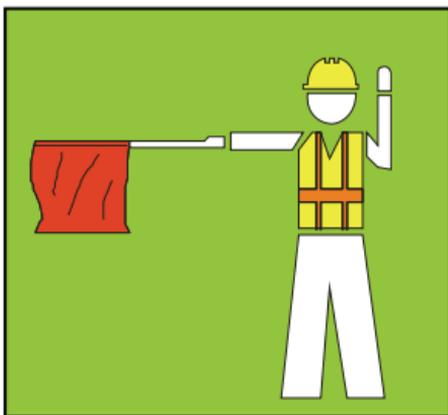
11. Flagging Procedures

Preferred Method



*To Stop
Traffic*

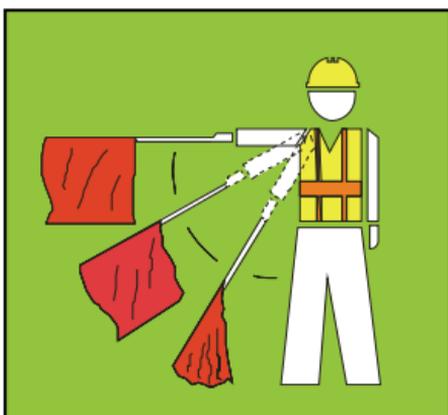
Emergency Situations Only



*To Let
Traffic
Proceed*



*To Alert
& Slow
Traffic*



A. Flagging Procedure Requirements

Properly Trained Flaggers

- Flaggers are certified? (must be in possession while flagging)
- Give clear & proper messages to drivers as shown
- Coordinate with other flaggers
- Allow time and distance for drivers to react

Properly Equipped Flaggers

- DDOT-approved sign paddles
- Electronic Communication equipment
- Approved safety vest or coat
- Proper attire (non-distracting)
- Wearing steel toed safety shoes
- Retroreflective night equipment

Proper Flagging Stations

- Good approach sight distance
- High visibility in traffic
- Never standing in moving traffic lane
- Consists of one flagger only per station

Proper Advanced Warning Signs

- Always use correct signs
- Allow reaction distance for drivers
- Remove signs when not flagging

Stop/Slow paddles should be used for standard work zone conditions, and shall consist of a 24-inch square sign mounted on a rod six (6) feet long. The sign panel shall be red with white lettering and trim for the "Stop" sign and orange with black lettering and trim for the "Slow" sign.

Flags should only be used in emergency situations, and shall be a minimum of 24 inches square, red in color and fixed to a staff about three (3) feet long.

B. Distance of Flagger Station in Advance of the Work Space

Speed (mph)	Distance (ft)
20	35
25	55
30	85
35	120
40	170
45	220
50	280
55	335
60	415
65	485

12. Liability

A. Steps to Minimize Liability

- Have a current & approved traffic control plan
- Apply the concepts of the latest version of the MUTCD (*Manual on Uniform Traffic Control Devices*)
- Minimize traffic disruptions
- Promptly install and remove temporary traffic controls as necessary
- Train all personnel in proper work zone safety techniques
- Inspect work zone sites daily for conformance or changing conditions
- Keep comprehensive documentation

B. Elements of a Good Inspection Program

- Routinely schedule inspections at different times of the day/evening
- Identify hazards and take corrective action
- Record observations and actions taken
- Verify corrective actions
- Update documentation

C. Minimum Documentation

- Who was on the site and when
- Where was the work taking place
- When were traffic control devices inspected and by whom
- Record of any irregularities, action taken as a result, and follow up inspection
- Additional information gathered in the event of a crash or incident.
- Other?

13. Daily Checklist for Temporary Traffic Control

- All devices meet specifications and quality standards.
- All signs are properly installed and legible.
- Arrow displays and Portable Changeable Message signs properly aligned and maintained.
- Proper taper and buffer lengths established.
- Channelized devices are clean, aligned, and properly spaced.
- Flaggers certified, properly equipped and using hand signals.
- Temporary barrier and attenuators properly installed and maintained in serviceable condition.
- Inapplicable traffic control devices removed when not required.
- Pavement markings in place at end of the work shift.
- Day and night drive-through inspections conducted and logged or recorded.

Checklist reviewed by:

(Name)

Location: _____

Date: _____

14. Typical Application Diagrams

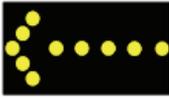
The diagrams on the following pages represent examples of the application of principles and procedures for safe and efficient traffic control in temporary traffic control zones and are not intended to be standards. It is not possible to include illustrations to cover every situation which will require work area protection. These typical layouts are not intended as a substitute for engineering judgment and should be altered to fit the conditions of a particular site. Contractor plans or other agency documents may also have applicable layouts to be followed.

The diagrams are not to scale, and the number of channelizing devices shown may not be the number needed at the work site. Use the tables on the typical diagrams to determine taper and buffer lengths, and use page 9 for guidance on the spacing and number of devices.

The notes and tables on the typical diagrams provide important information for the user.

Read all notes before using these diagrams. The information presented in these diagrams and tables are generally minimums. For further information, refer to Part VI of the latest version of the MUTCD. These contain the standards for work zone traffic control, including sign type numbers and dimensions of signs.

15. Legend for Typical Applications



Arrow panel



Arrow panel support or trailer
(shown facing down)



Channelizing Device



Direction of temporary traffic detour



Direction of traffic



Flagger



High level warning device
(flag tree)



Illuminated Flashing
Amber (caution Mode)
Type B or C



Sign (shown facing left)



Truck mounted attenuator



Traffic Signal



Type III barricade



Work space

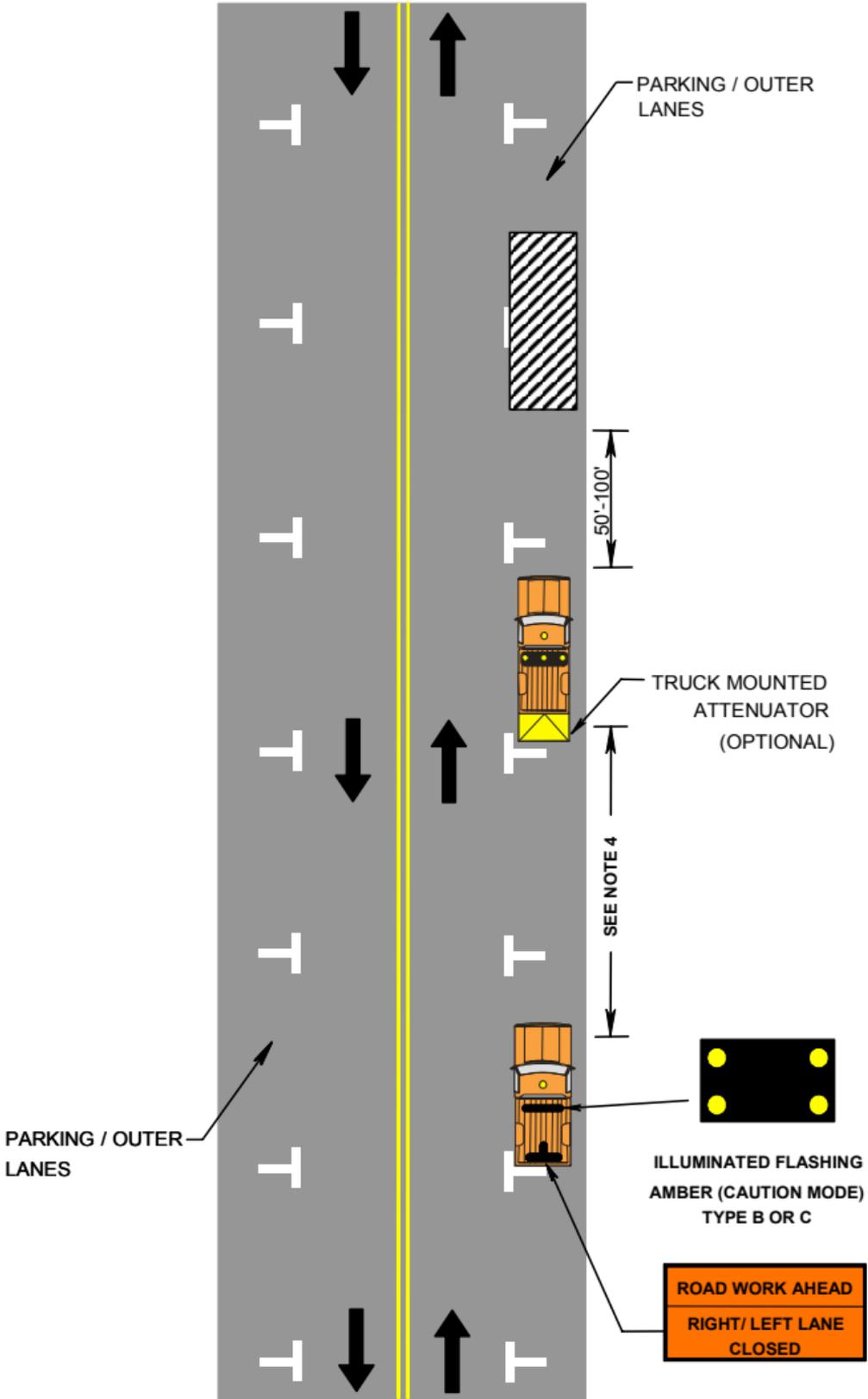


Work Vehicle with Flashing Light

Notes for Figure

A Road Work Ahead sign should be placed on the left side of the roadway for a divided or one-way street only if the left shoulder is affected.

The Worker Symbol (W21-1) signs may be used instead of Road Work Ahead signs.



Typical Application: Mobile or Short Duration

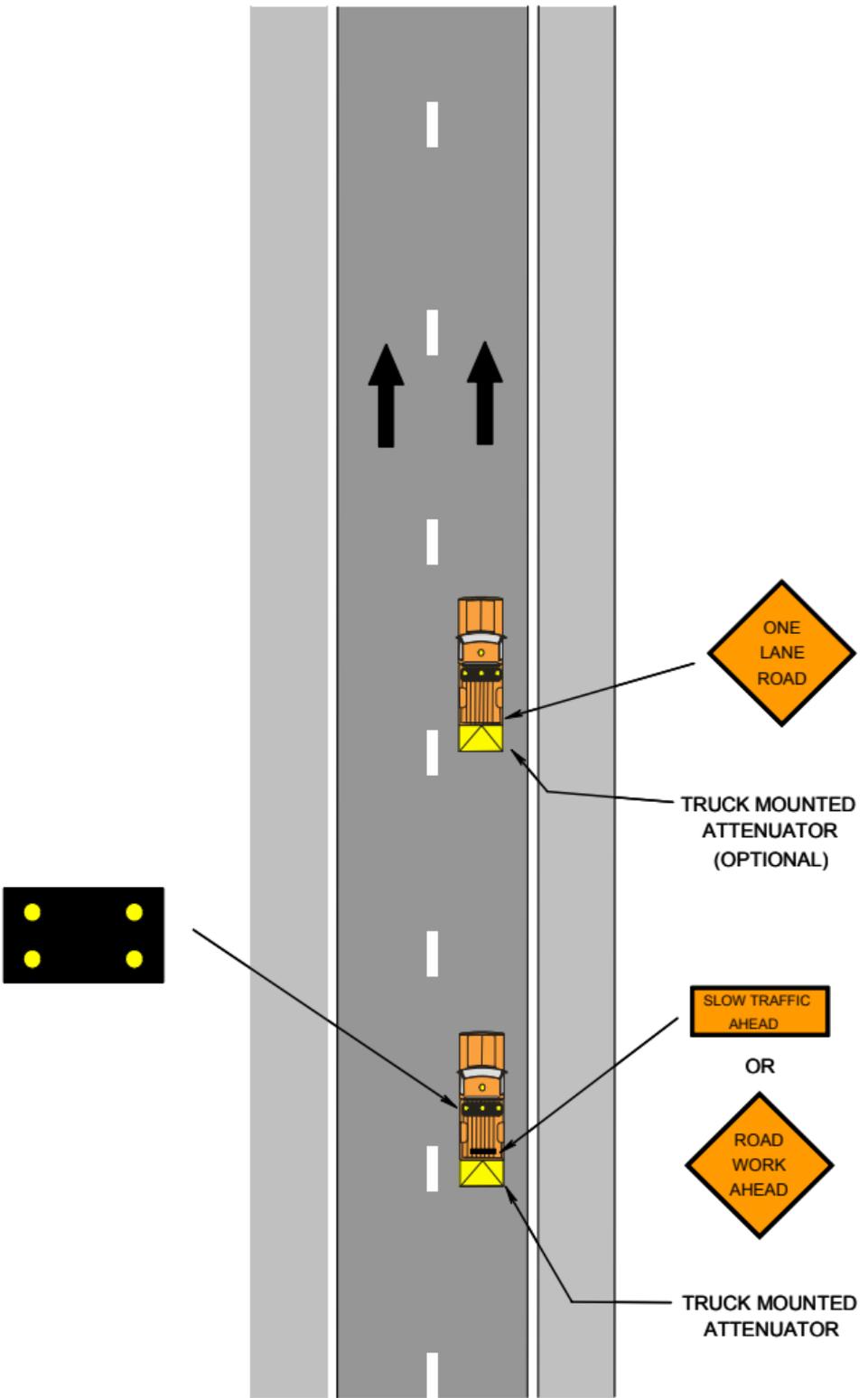
Notes for Figure

In those situations where multiple work locations within a limited distance make it practical to place stationary signs, the distance between the advance warning sign and the work should not exceed 1 block in urban low-speed areas or 1 mile on high-speed roads.

Each vehicle involved in the mobile operation shall have at least one rotating amber light or high intensity amber strobe light.

“Utility Work Ahead” may be used in low-speed urban areas or “Shoulder Work Ahead” may be used along highways with shoulders.

72-hour advanced parking restrictions are required for mobile operations, except in the event of an emergency.



Typical Application: Mobile Operations on a High-Speed Road

Notes for Figure

Vehicle-mounted signs shall be mounted with the bottom of the sign at a minimum height of 48 inches above the pavement. Sign legends shall be covered or turned from view when work is not in progress.

Shadow and work vehicles shall display rotating lights or strobe lights.

Provision of a Truck Mounted Attenuator (TMA) on the leading vehicles is dependent on the following distance between the two vehicles. If following distance is greater than values below, a TMA is required.

Posted Speed Limit (MPH)	Following Distance
25	250'
30	300'
35	300'
40	400'
45	450'
50	500'
55	550'

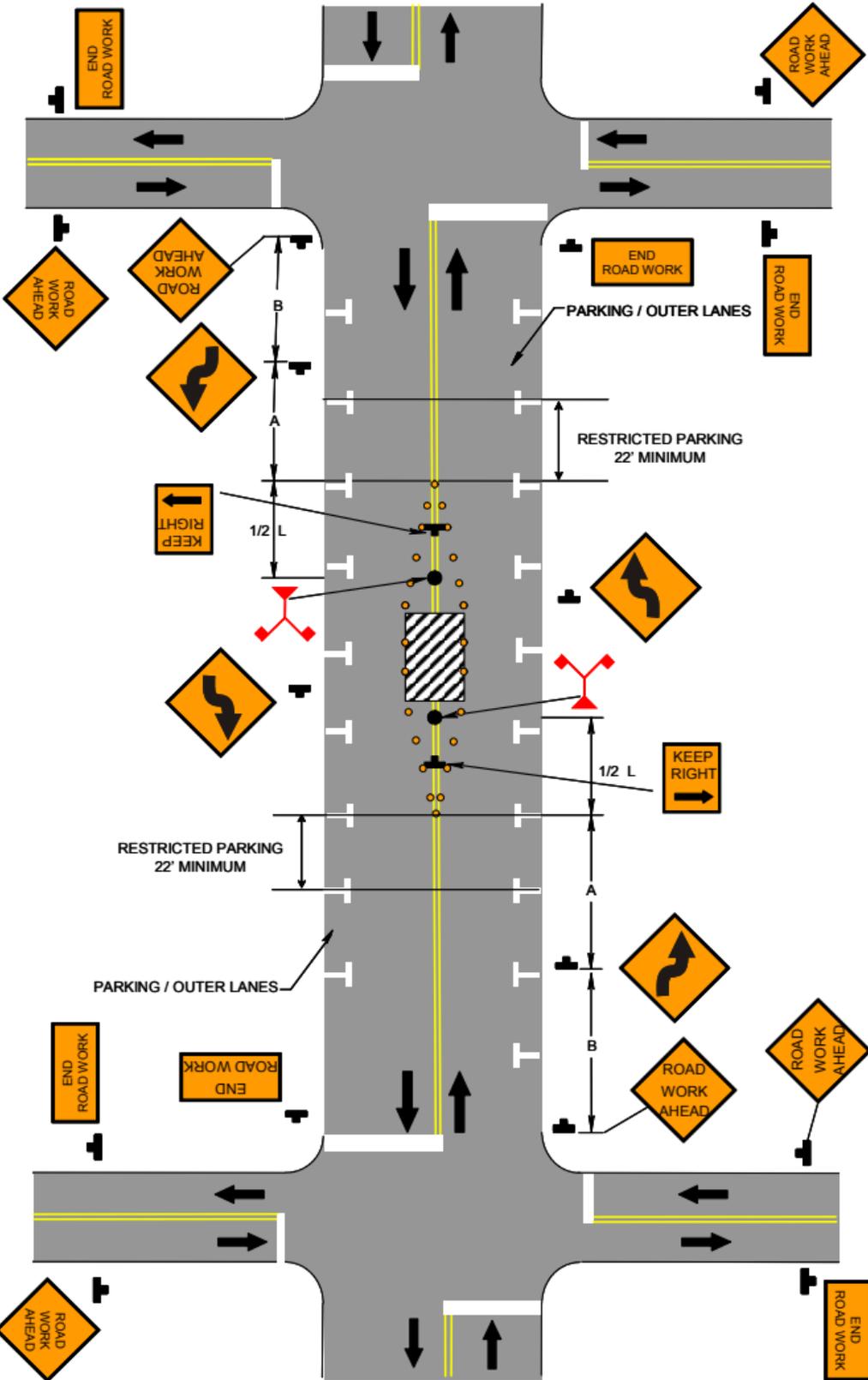
Notes for Figure

In those situations where multiple work locations within a limited distance make it practical to place stationary signs, the distance between the advance warning sign and the work should not exceed 1 block in urban low-speed areas or 1 mile on high-speed roads.

This application is shown where encroachment occurs in the parking lane or curb lane. In cases where there are shoulders, the “Right Lane Closed Ahead” sign will be replaced with a “Shoulder Work” sign (i.e. on divided high-speed highways.) Spacing will vary depending on road classification type and speed. Refer to Part VI of the latest version of the MUTCD.

Each vehicle involved in the mobile operation shall have at least one rotating amber light or high intensity amber strobe light.

Any situation or location that requires more than three days of lane closures or impacts requires installation of temporary pavement markings.



Typical Application: Closure in the Center of a Local or Low-Volume Road

Notes for Figure

Where buses are permitted, the lanes on either side of the center work space should have a minimum width of 11 feet (3.3 m) as measured from the near edge of the channelizing devices to the edge of pavement or the outside edge of paved shoulder.

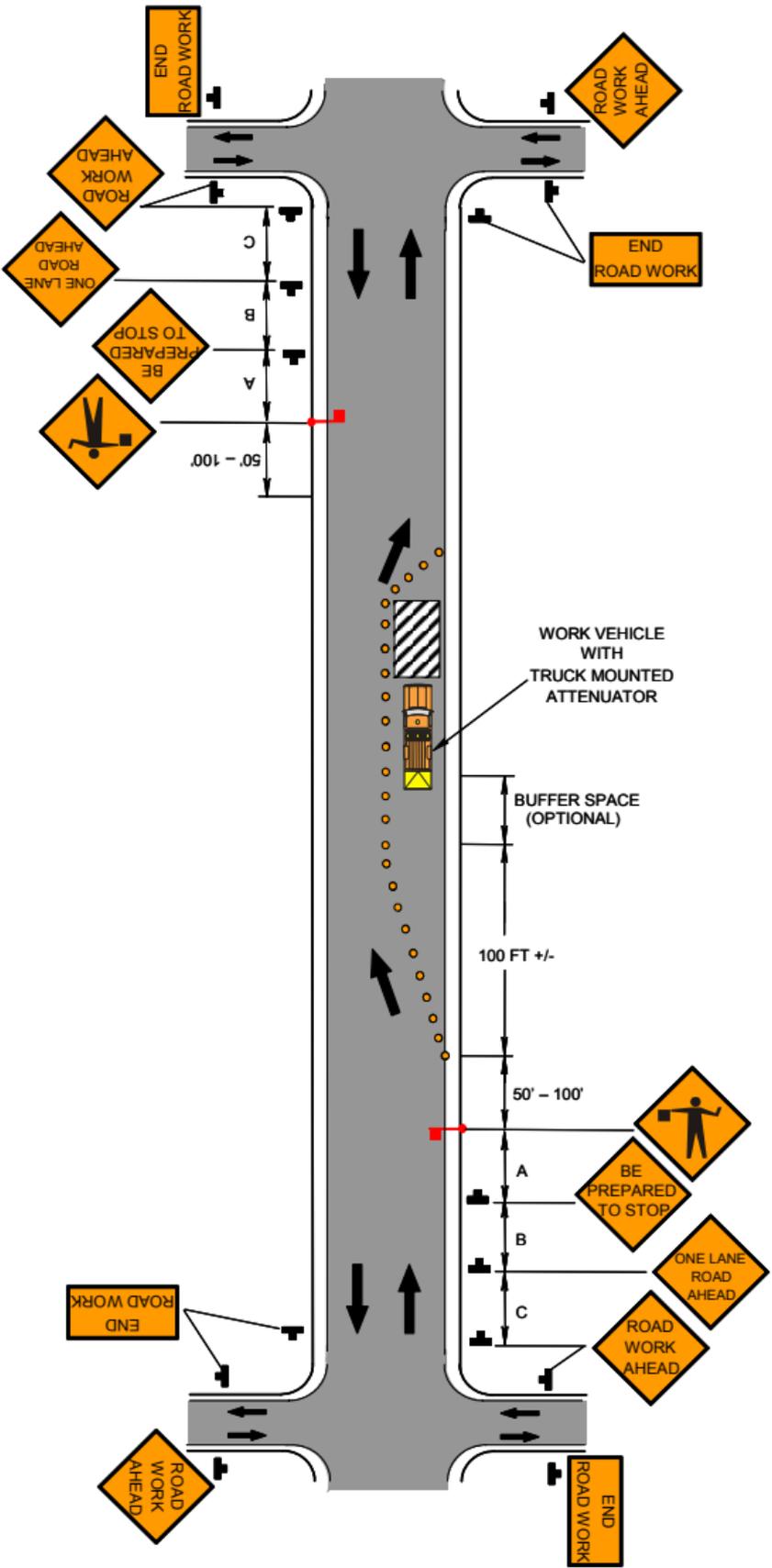
Flashing warning lights and/or flags may be used to call attention to the advanced warning signs.

If the closure continues overnight, warning lights may be used on the channelizing devices.

A lane width of 10 feet (3.0 m) may be used for short-term stationary work on low-volume, low-speed roadways when motor vehicle traffic does not include longer and wider heavy commercial vehicles and where buses are restricted.

A work vehicle displaying rotating lights or strobe lights may be used instead of the channelizing devices forming the tapers or the high-level warning devices.

Although vehicle hazard warning signals can be used to supplement the rotating light or strobe lights, they shall not be used instead of rotating lights or strobe lights.

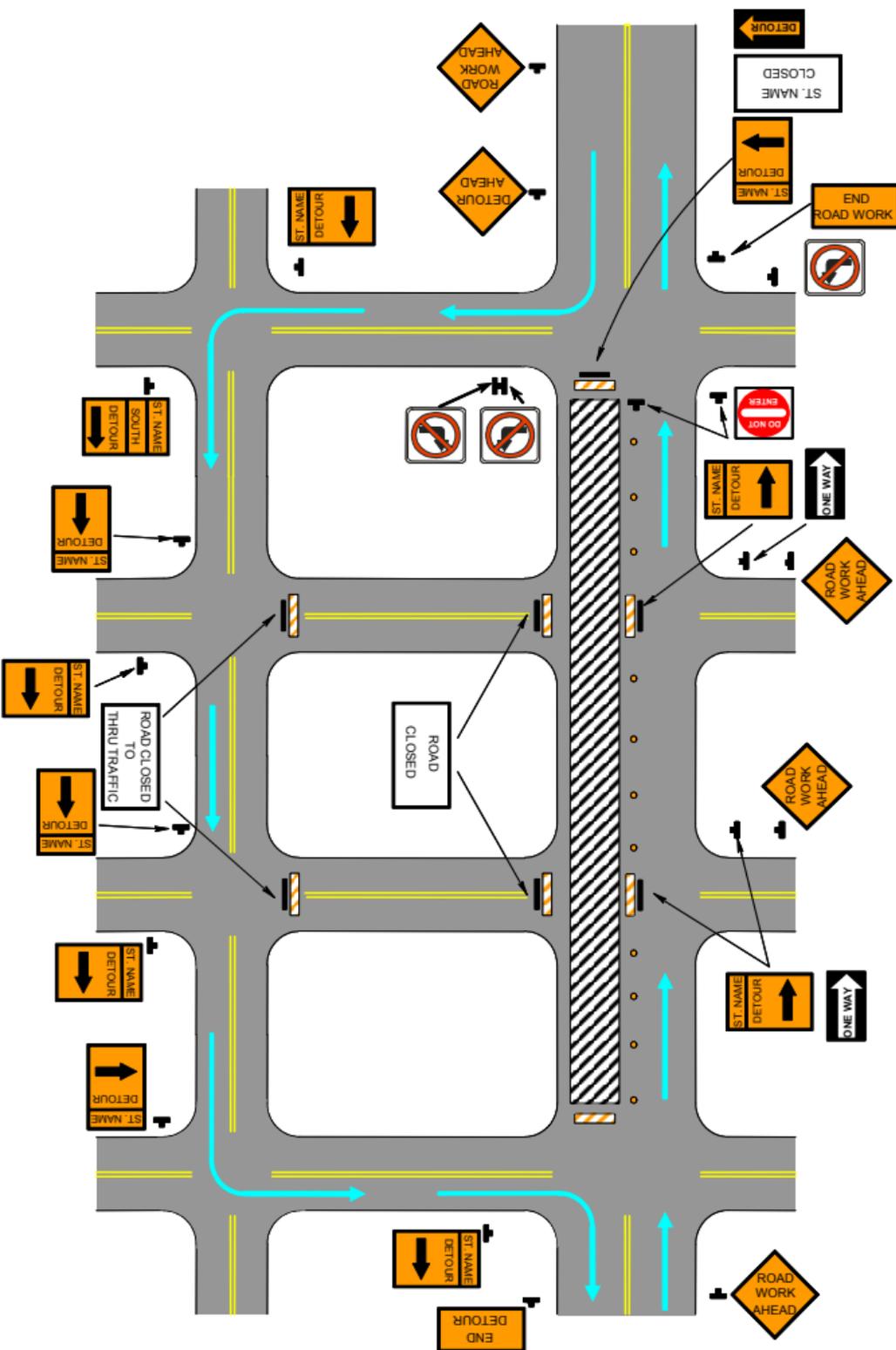


Typical Application: Lane Closure on a Minor Street

Notes for Figure

This temporary traffic control shall be used only for low-volume, low-speed facilities.

When motor vehicle traffic cannot effectively self-regulate, one or two flaggers shall be used.



Typical Application: Road Closure and Detour for One Travel Direction

Notes for Figure

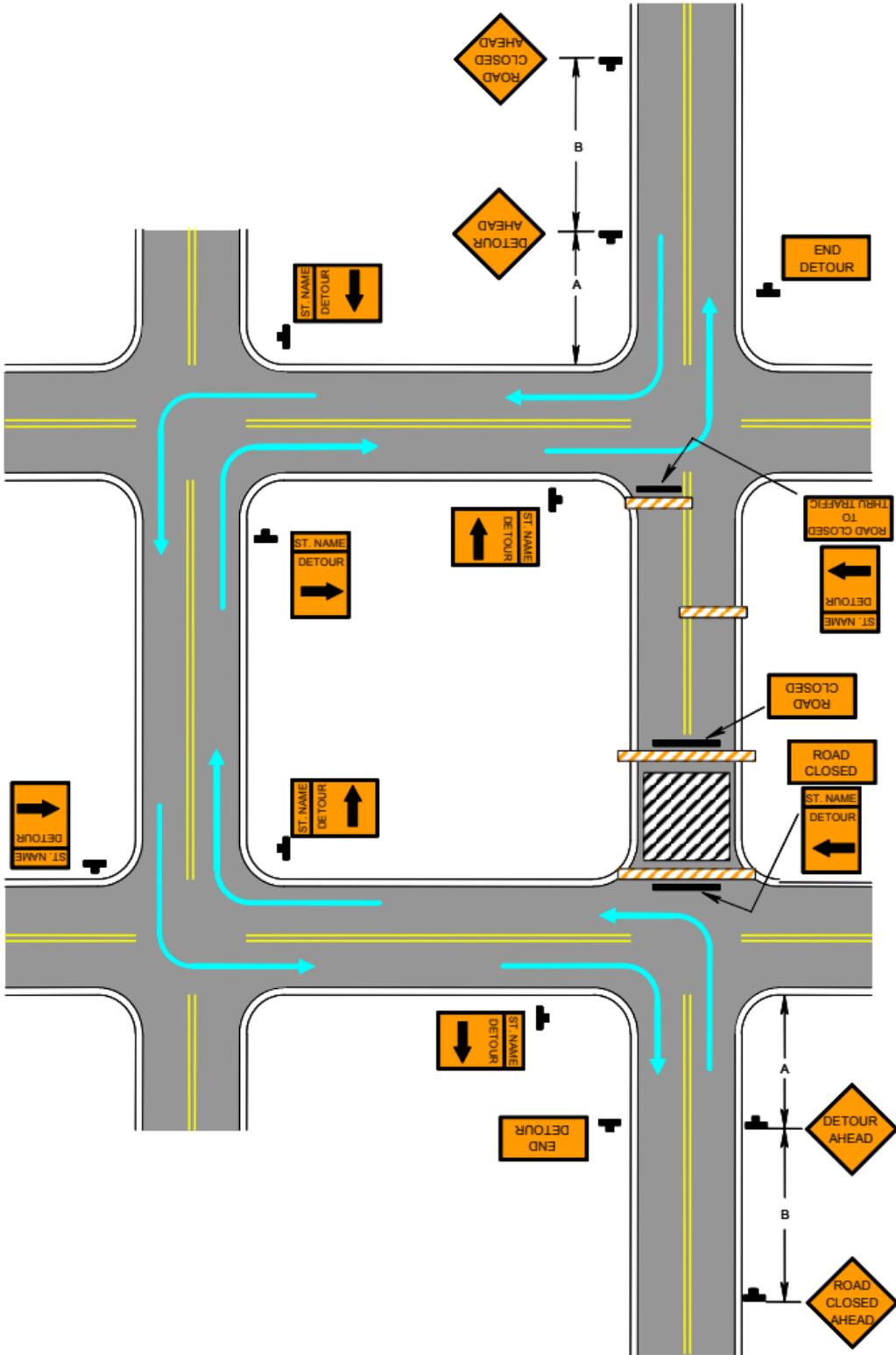
This layout is appropriate for city streets and local roadways. See Figure 6H-8 or 6H-p of the MUTCD Part VI for closing and detouring a numbered highway.

When used, the Street Name sign shall be placed above the Detour sign.

The STREET CLOSED legend may be used in place of ROAD CLOSED.

When a side road intersects the roadway within the work zone, place Type III barricades and ROAD CLOSED signs at the intersection, and provide advance signing of the closure on the side road approaches.

DETOUR signs may be located on the far side of the intersections, provided the intersection width does not create a sight distance issue.



Typical Application: Road Closure and Detour for Two Travel Directions

Notes for Figure

This layout is appropriate for city streets and local roadways. See Figure 6H-8 or 6H-p of the MUTCD, Part VI for closing and detouring a numbered highway.

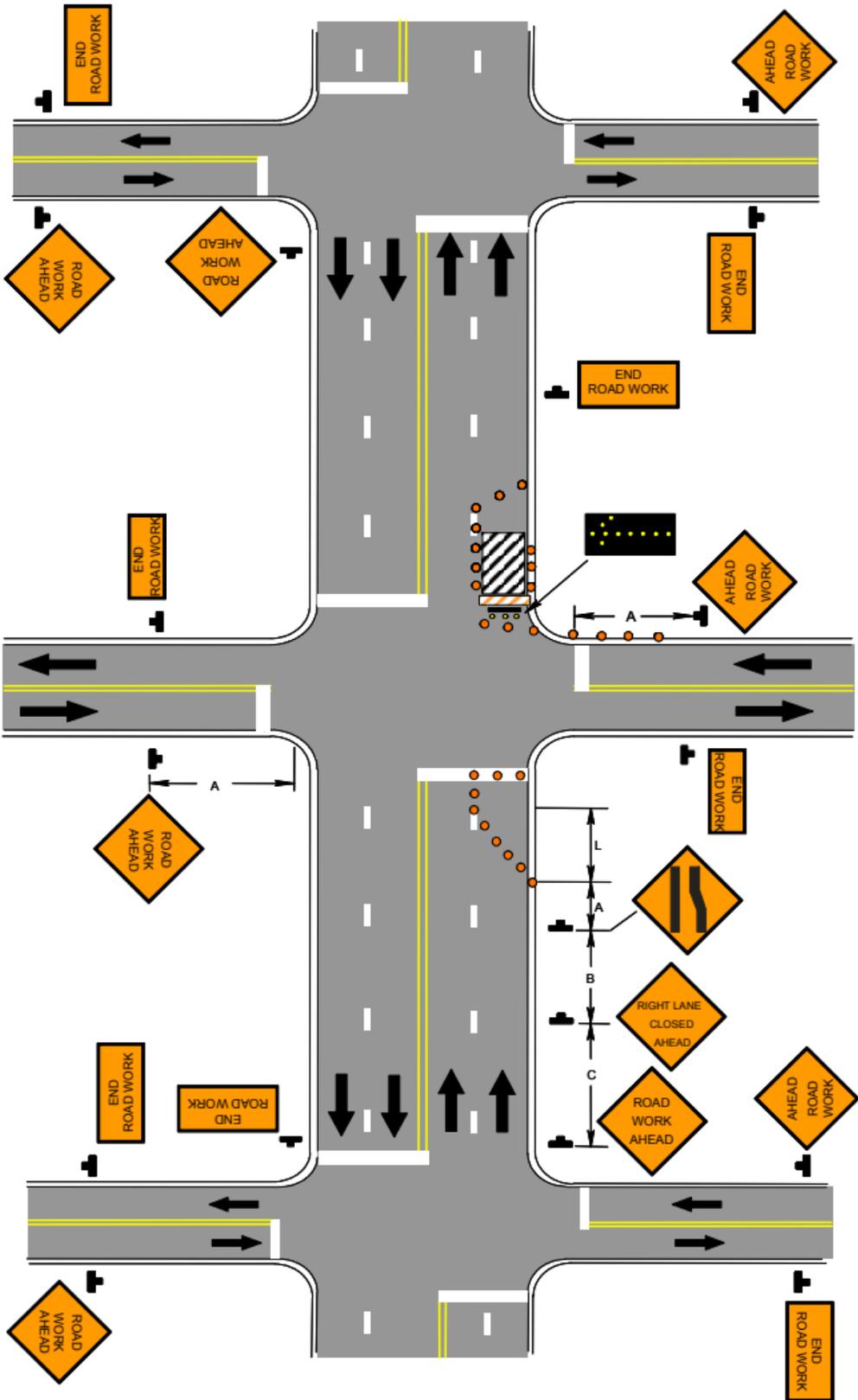
When used, the Street Name sign shall be placed above the Detour sign.

The STREET CLOSED legend may be used in place of ROAD CLOSED.

When a side road intersects the roadway within the work zone, place Type III barricades and ROAD CLOSED signs at the intersection, and provide advance signing of the closure on the side road approaches.

DETOUR signs may be located on the far side of the intersections, provided the intersection width does not create a sight distance issue.

The District Fire Marshall must give approval prior to the beginning of work on this type of application.



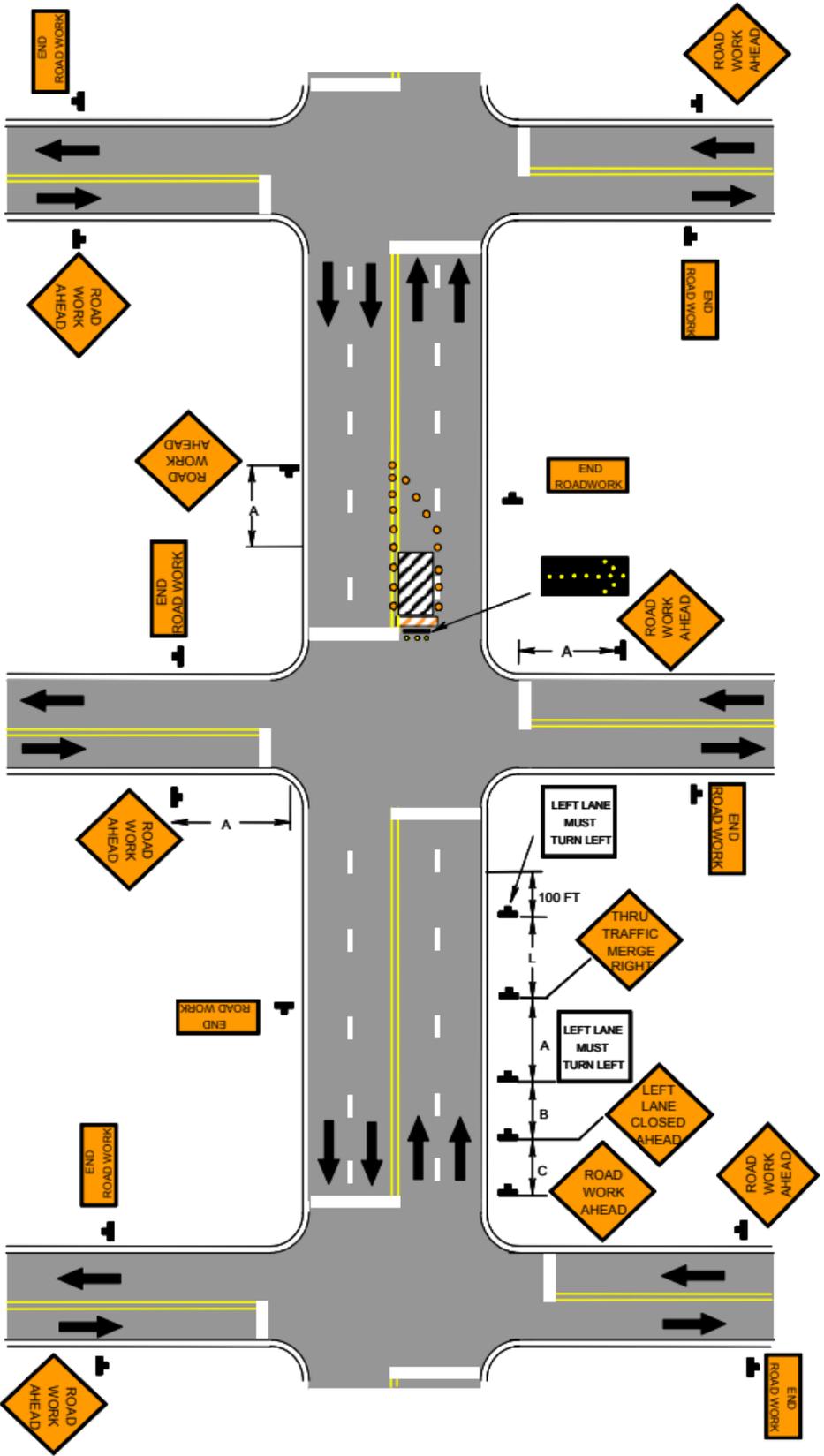
Typical Application: Right Lane Closure at Far Side of the Intersection

Notes for Figure

The normal procedure is to close, on the near side of the intersection, any lane that is not carried through the intersection. However, when this results in the closure of a right lane having significant right-turning movements, the right lane may be restricted to right turns only. This procedure increases the through capacity by eliminating right turns from the open through lane.

If the work space extends across a crosswalk, the crosswalk should be closed using the procedures and methods shown at the end of these typical applications (see Sidewalk Closure and Bypass Sidewalk Operation)

When the turning radius is large, it may be possible to create a right-turn island using channelizing devices.



Typical Application: Left Lane Closure at Far Side of the Intersection

Notes for Figure

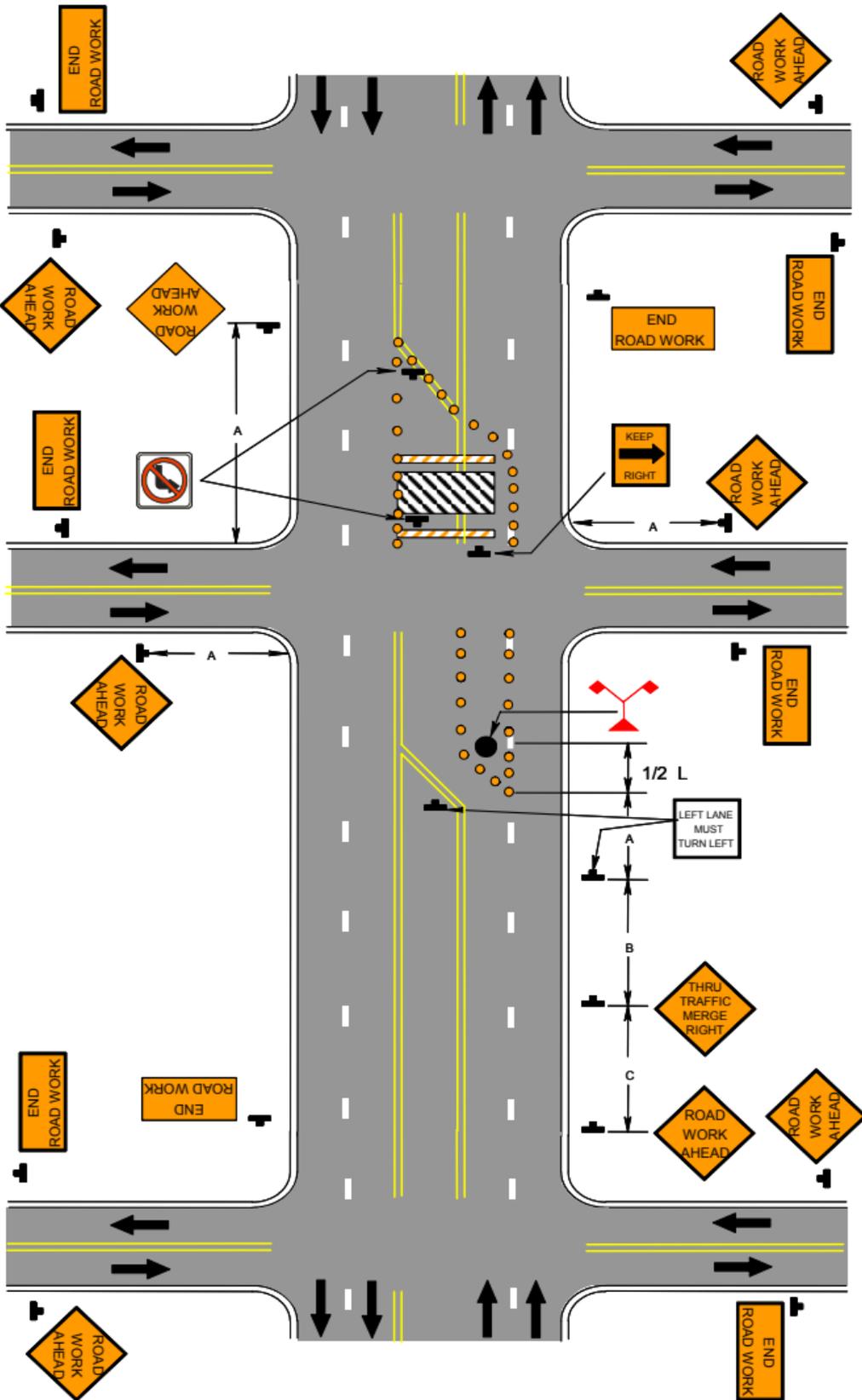
The normal procedure is to close, on the near side of the intersection, any lane that is not carried through the intersection. However, when this results in the closure of a left lane having significant left-turning movements, the left lane may be reopened as a turn bay for left turns only, as shown. This procedure increases the through capacity by eliminating left turns from the open through lane.

If the work space extends across a crosswalk, the crosswalk should be closed using the procedures and methods shown at the end of these typical applications (see Sidewalk Closure and Bypass Sidewalk Operation).

If heavy through movements typically utilize the left lane, channelization devices should be used to close off the left lane with a taper and then the lane may be reopened, as shown in Figure 6H-23 in Part VI of the latest version of the MUTCD.

d.

51



Typical Application: Multiple Closures at Intersection

Notes for Figure

If the work space extends across a crosswalk, the crosswalk should be closed using the procedures and methods shown at the end of these typical applications (see Sidewalk Closure and Bypass Sidewalk Operation).

If the left through lane is closed on the near-side approach, the LEFT LANE MUST TURN LEFT sign should be placed in the median to discourage through vehicular traffic from entering the left-turn bay.

If the situation or location remains under construction for greater than three days, the KEEP RIGHT is replaced with an R4-7 sign.

Notes for Figure

A high-level warning device may be placed in the work space if there is sufficient room.

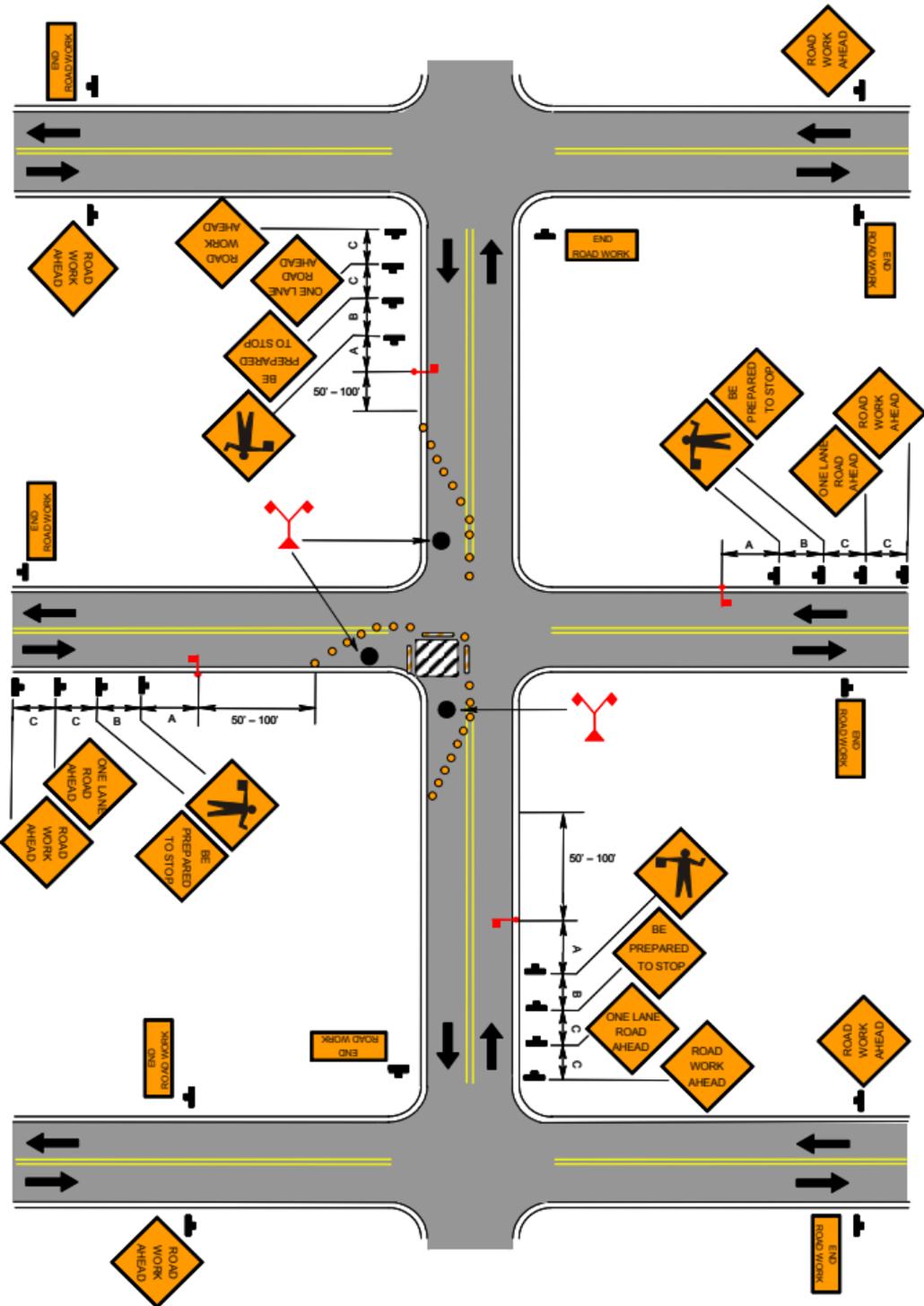
For short-term use on low-volume, low-speed roadways, with vehicular traffic that does not include heavy commercial vehicles or buses, a minimum of ten feet (10 ft.) may be used.

Unless the streets are wide, it may be physically impossible to turn left, especially for large vehicles. Left turns may be prohibited as required by geometric conditions.

If the situation or location remains under construction for greater than three days, the KEEP RIGHT is replaced with an R4-7 sign.

The arrow panel should be placed as close to the beginning of the taper as possible and as space allows.

A taper length of $\frac{1}{2} L$ is the minimum allowed IF approved by the Engineer (for roadways where bus and trucks are restricted); otherwise, use a shifting taper of L .

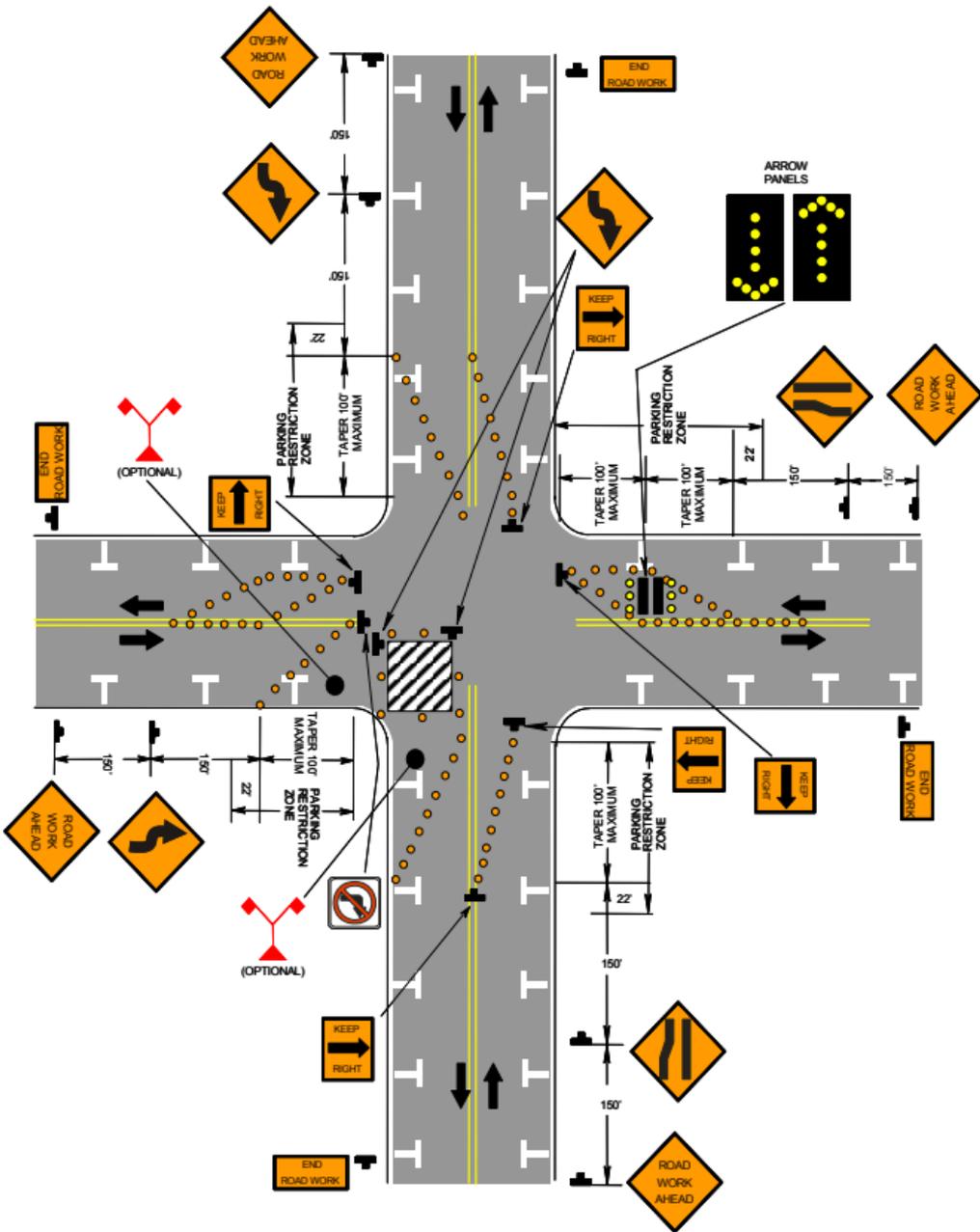


**Typical Application: Closure at Side of Intersection
(With No Parking Lanes)**

Notes for Figure

The situation depicted may be simplified by closing one or more of the intersection approaches. If this cannot be done and/or when capacity is a problem, through vehicular traffic should then be directed to other roads or streets.

Turns can be prohibited as required by vehicular traffic conditions. Unless the streets are wide, it might be physically impossible to make certain turns, especially for commercial vehicles or buses.

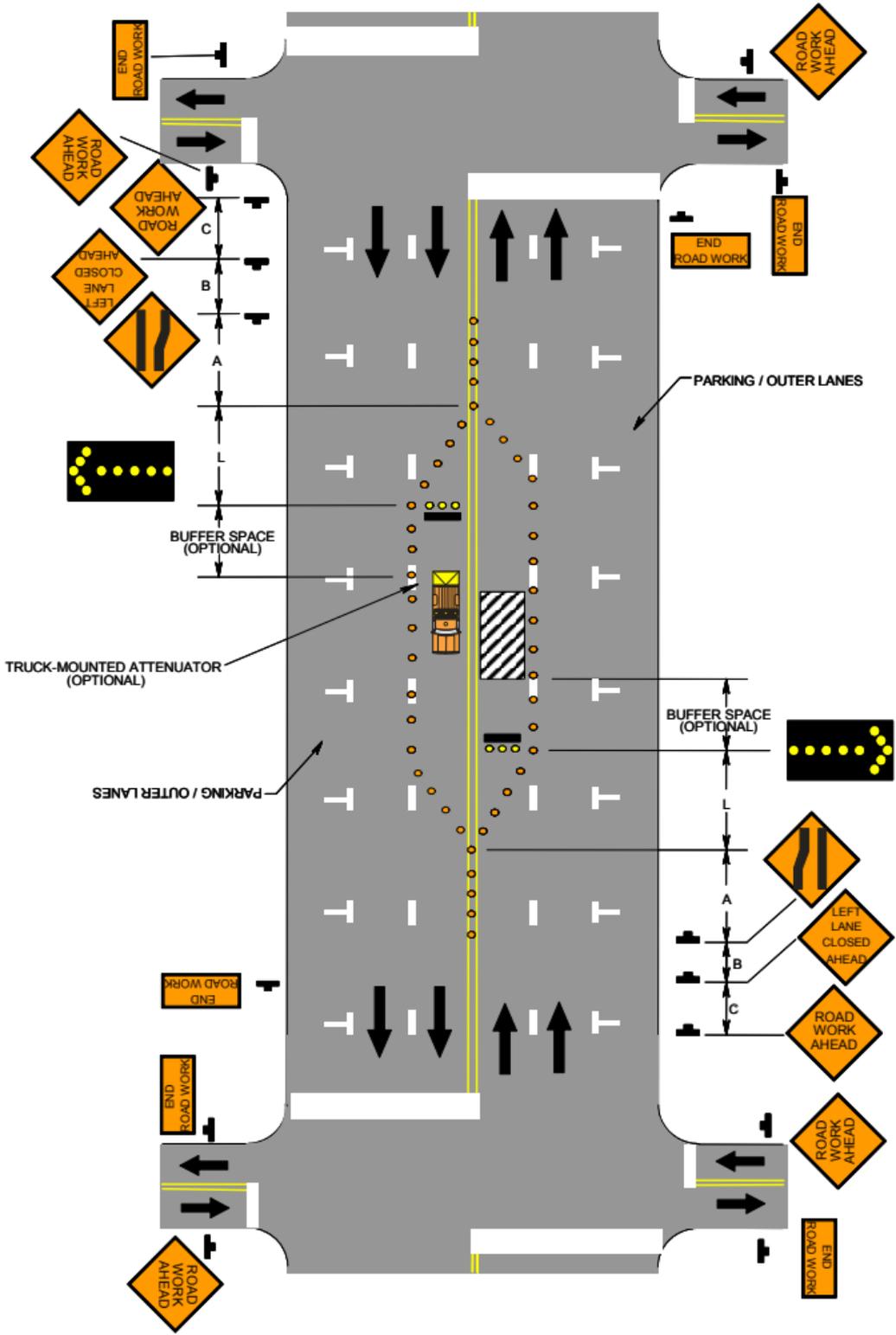


Typical Application: Closure at Side of Intersection (With Parking Lanes)

Notes for Figure

The situation depicted may be simplified by closing one or more of the intersection approaches. If this cannot be done and/or when capacity is a problem, through vehicular traffic should then be directed to other roads or streets.

Turns can be prohibited as required by vehicular traffic conditions. Unless the streets are wide, it might be physically impossible to make certain turns, especially for commercial vehicles or buses.

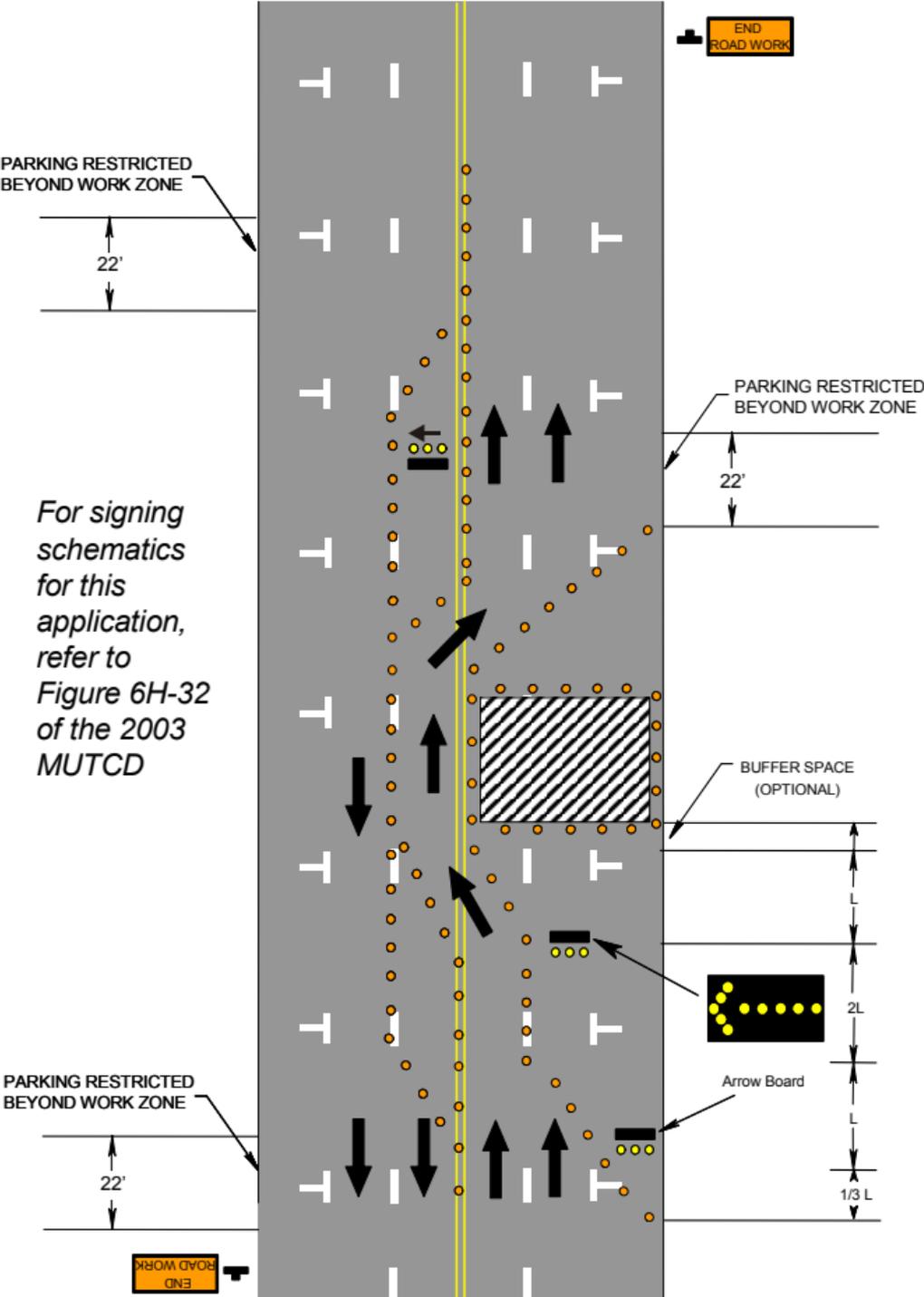


Typical Application: Interior Lane Closure on Multi-Lane Roadway or Street

Notes for Figure

The closure of the adjacent interior lane in the opposing direction may not be necessary, depending upon the activity being performed and the work space needed for the operation.

Shadow vehicles with a truck-mounted attenuator may be used.



Typical Application: Merging Taper Followed by Shifting Taper on Multilane Road

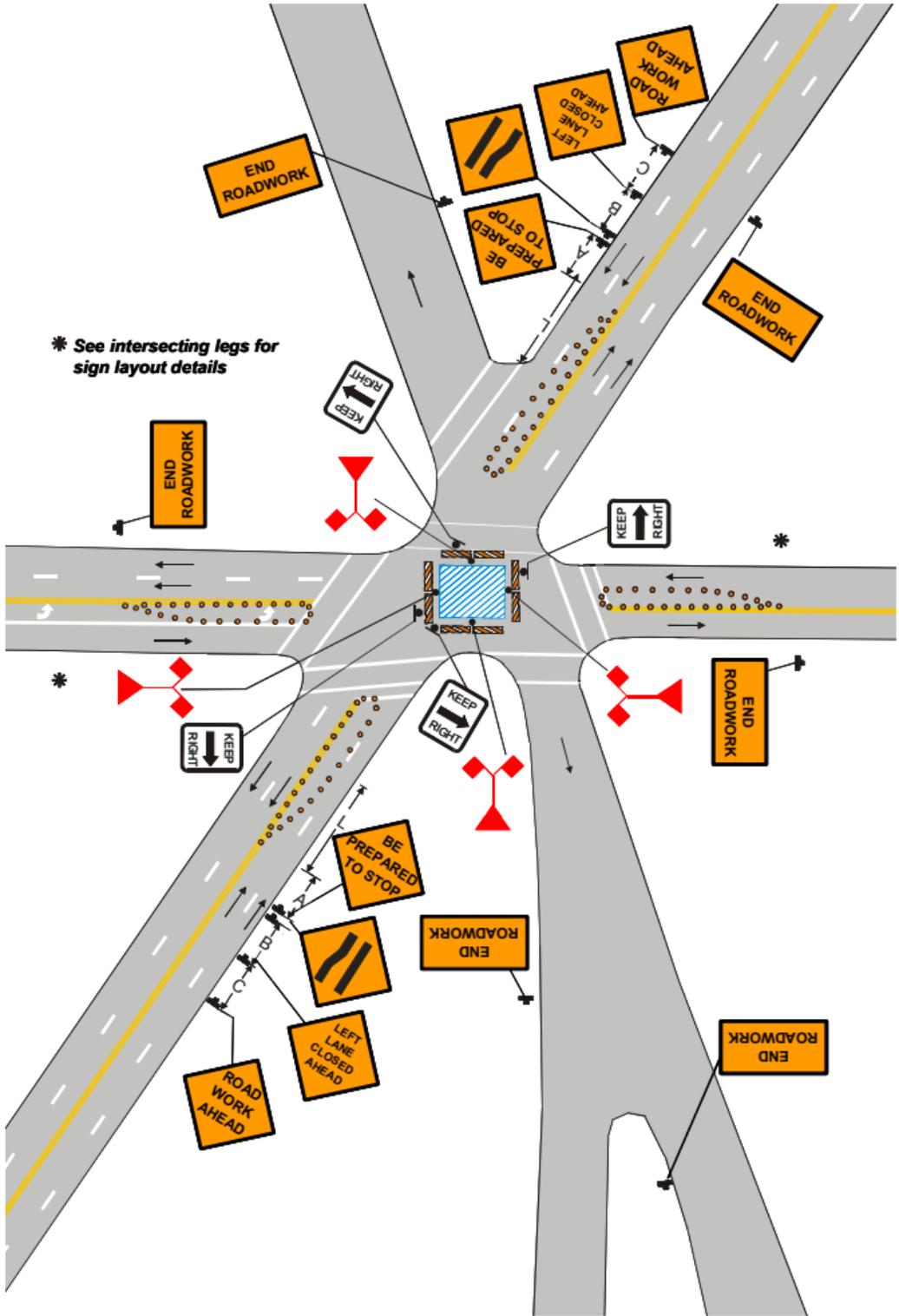
Notes for Figure

Except for short-term durations, temporary markings shall be provided to clearly delineate the temporary travel path. Pavement markings no longer applicable shall be removed or obliterated as soon as practical. For short-term situations where it is not feasible to remove and restore pavement markings, channelization shall be made dominant by using a very close device spacing.

When channelization devices are used instead of pavement markings, the maximum spacing should be $0.5 \times S$ feet, where S is the speed in mph.

If the tangent distance along the temporary diversion is more than 600 feet, a Reverse Curve sign, left first, should be used instead of the Double Reverse Curve sign, and a second Reverse Curve sign, right first, should be placed in advance of the second reverse curve back to the original alignment.

Minimum Lane widths for this application are 10 feet.



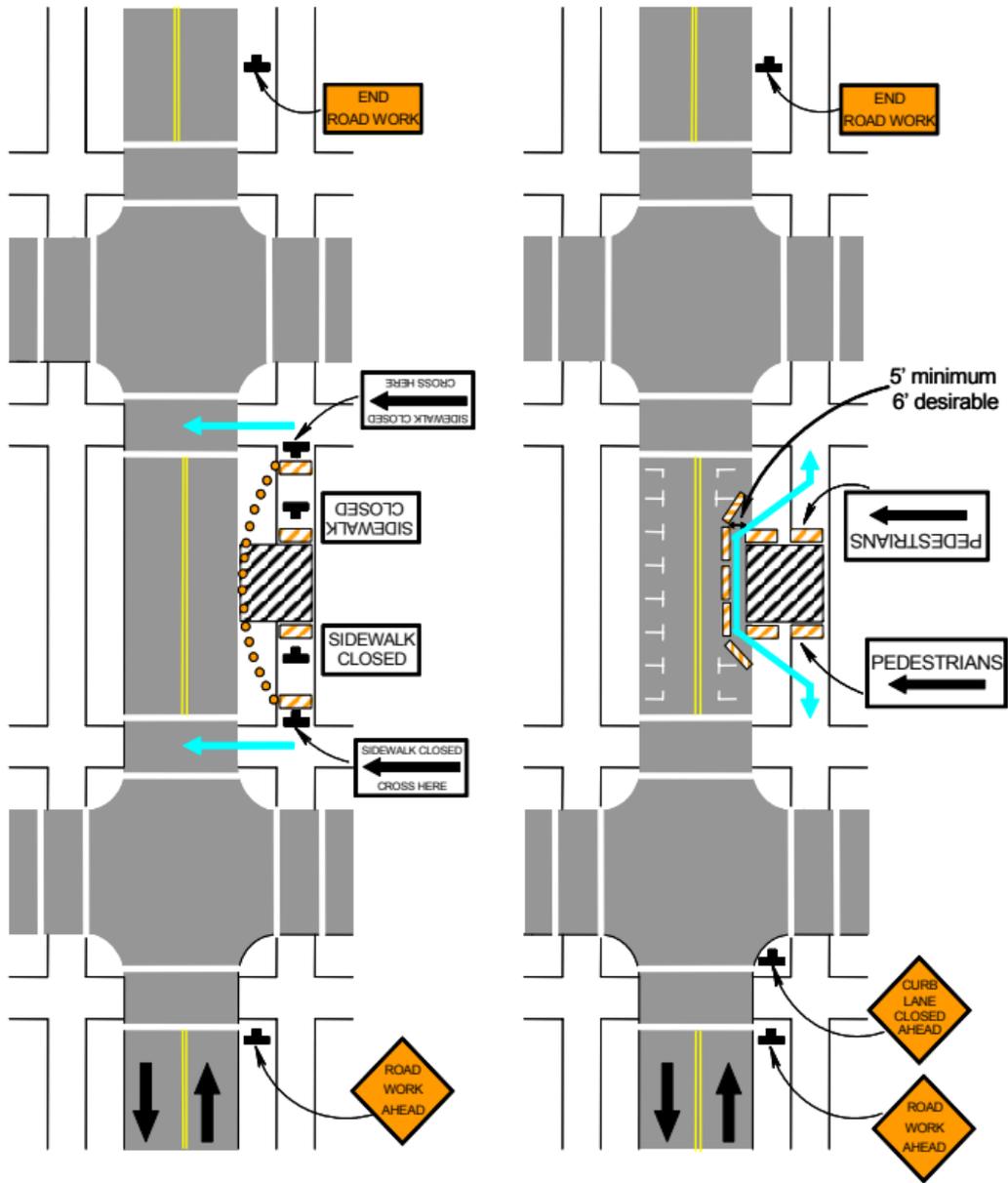
Typical Application: Multi-leg Intersection

Notes for Figure

A high-level warning device should be placed in the work space if there is sufficient room.

For short-term use on low-volume, low-speed roadways, with vehicular traffic that does not include heavy commercial vehicles or buses, a minimum of nine ten (10 ft.) may be used.

Unless the streets are wide, it may be physically impossible to turn left, especially for large vehicles. Left turns may be prohibited as required by geometric conditions.



Typical Application: Sidewalk Closure and Bypass Sidewalk Operation

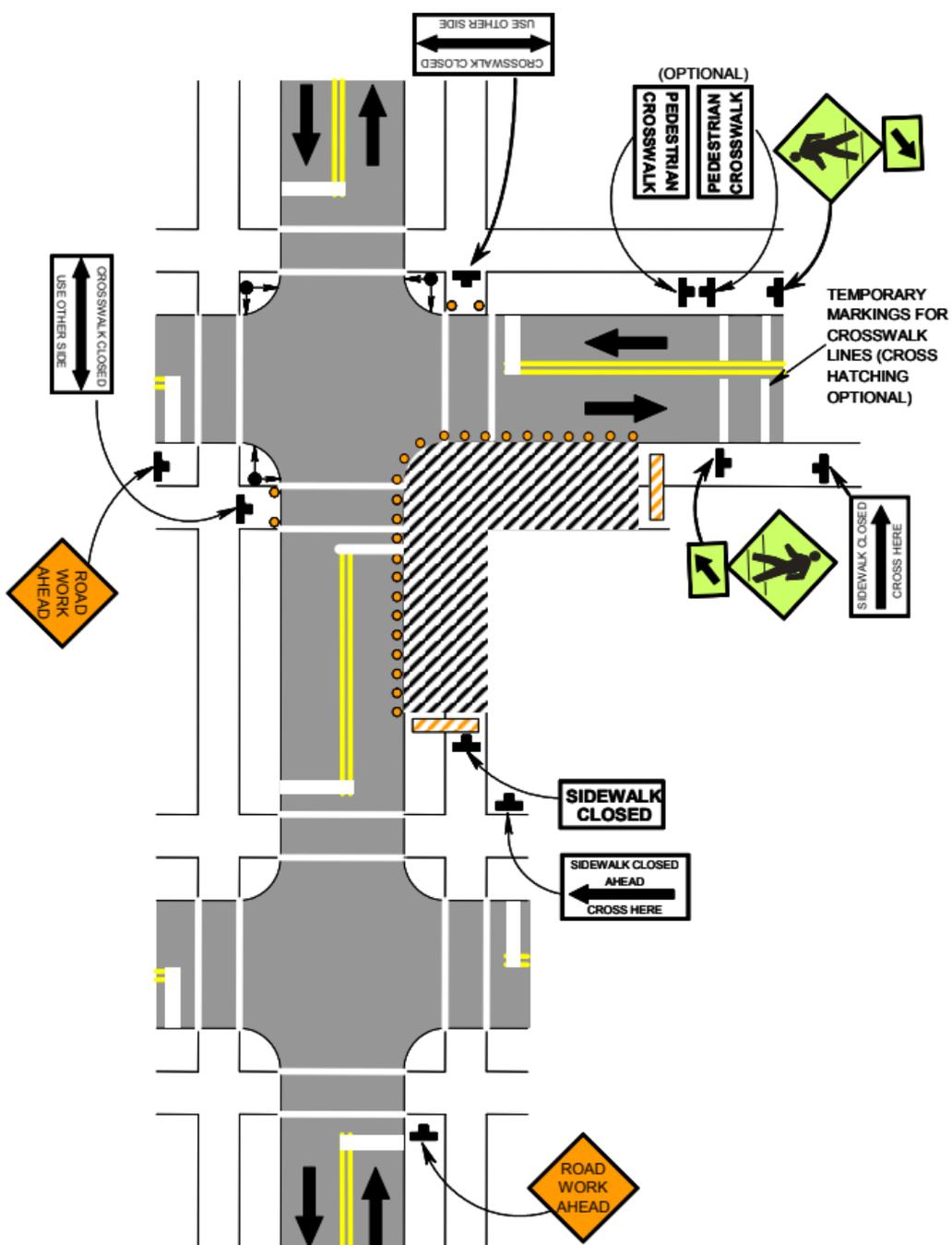
Notes for Figure

When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable (by pedestrians and motorists) and shall include accessibility features consistent with the feature present in the existing pedestrian facility.

Bypass Sidewalk Operations must account for use by wheelchairs or provide an alternate means of conveyance for pedestrians with disabilities.

Only the Temporary Traffic Control devices related to pedestrians are shown. Other devices, such as lane closure signing or ROAD NARROWS signs, may be used to control vehicular traffic.

Signs, such as KEEP RIGHT (or LEFT), may be placed along a temporary sidewalk to guide or direct pedestrians.



Typical Application: Crosswalk Closures and Pedestrian Detours

Notes for Figure

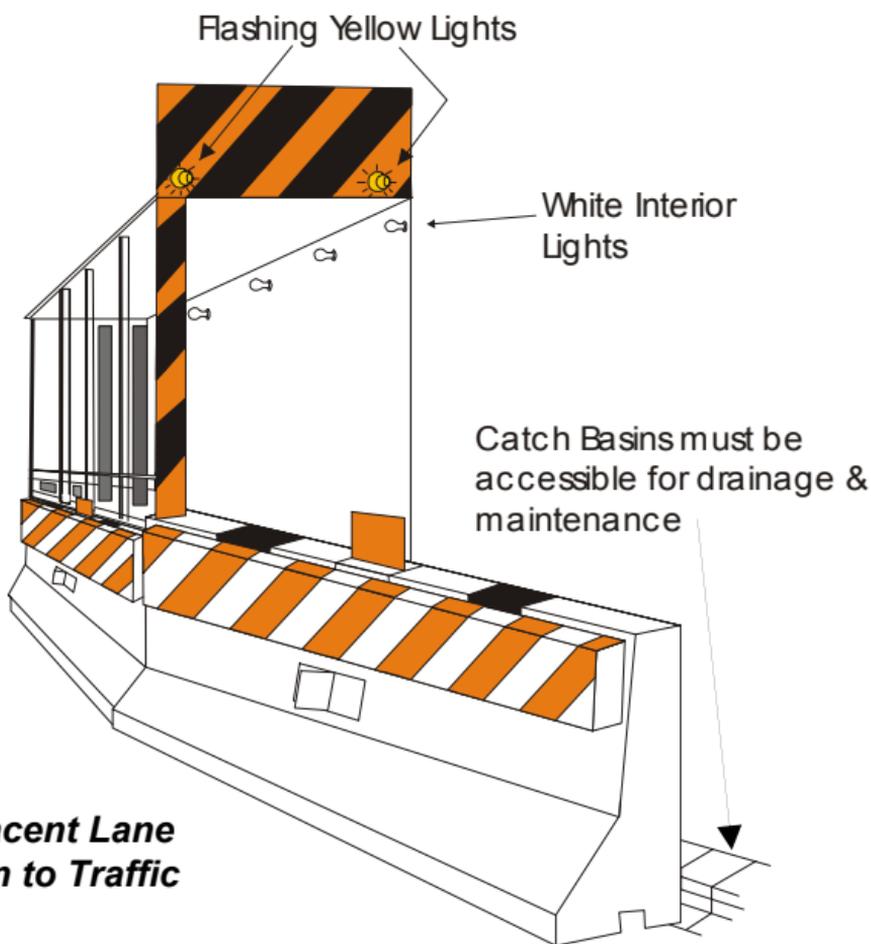
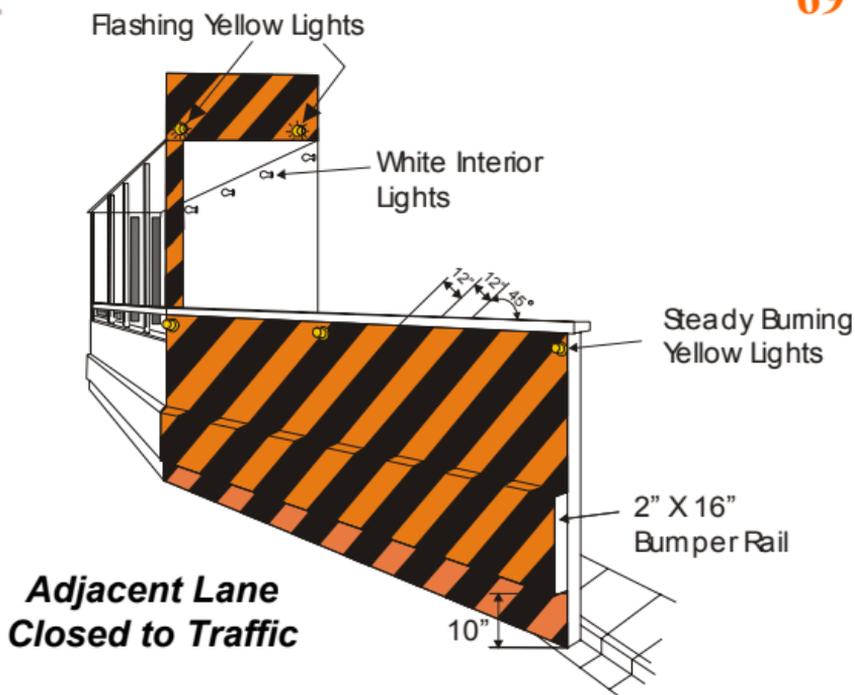
When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable (by pedestrians and motorists) and shall include accessibility features consistent with the feature present in the existing pedestrian facility.

Curb parking shall be prohibited for at least 50 feet in advance of the mid-block crosswalk.

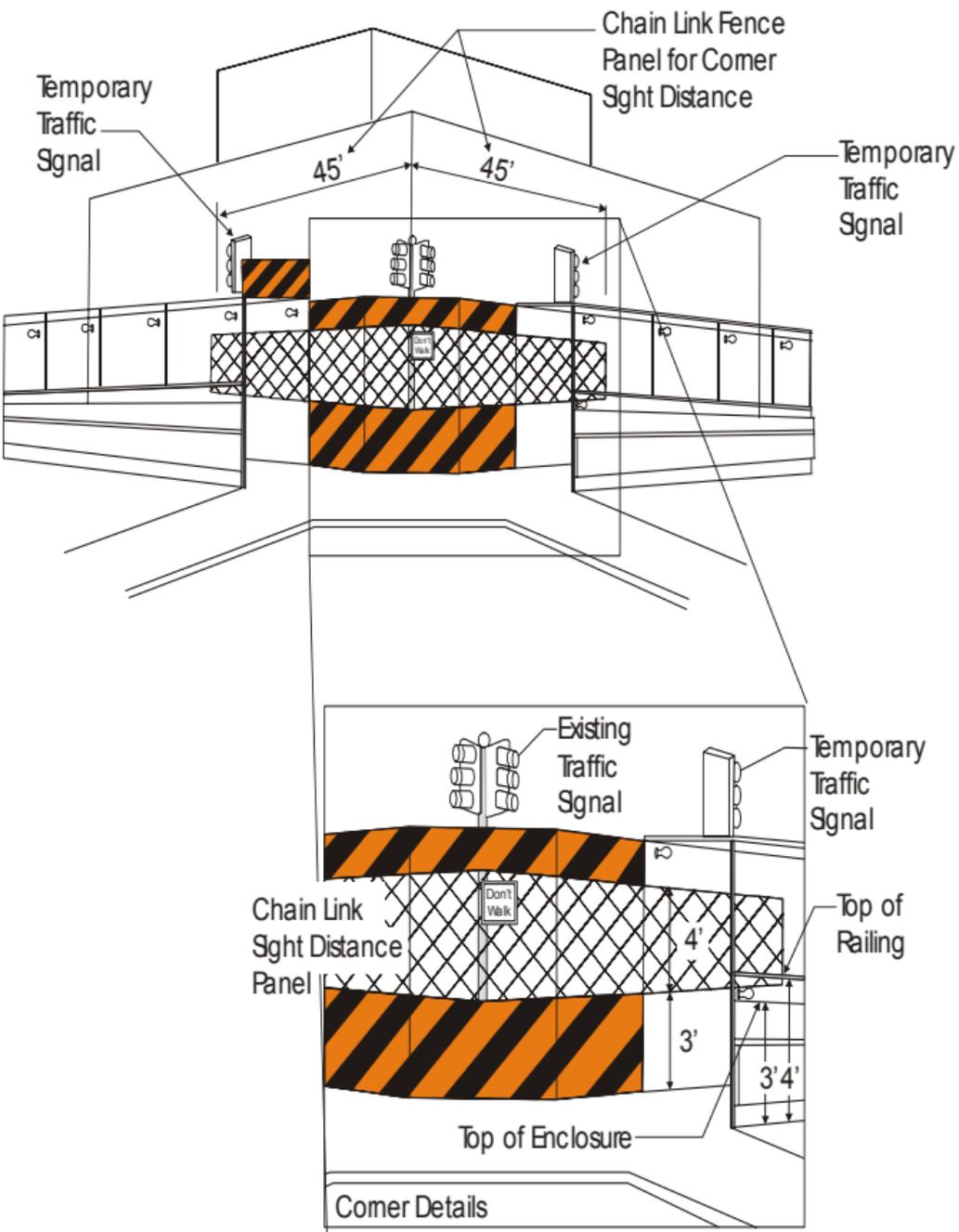
Only the Temporary Traffic Control devices related to pedestrians are shown. Other devices, such as lane closure signing or ROAD NARROWS signs, may be used to control vehicular traffic.

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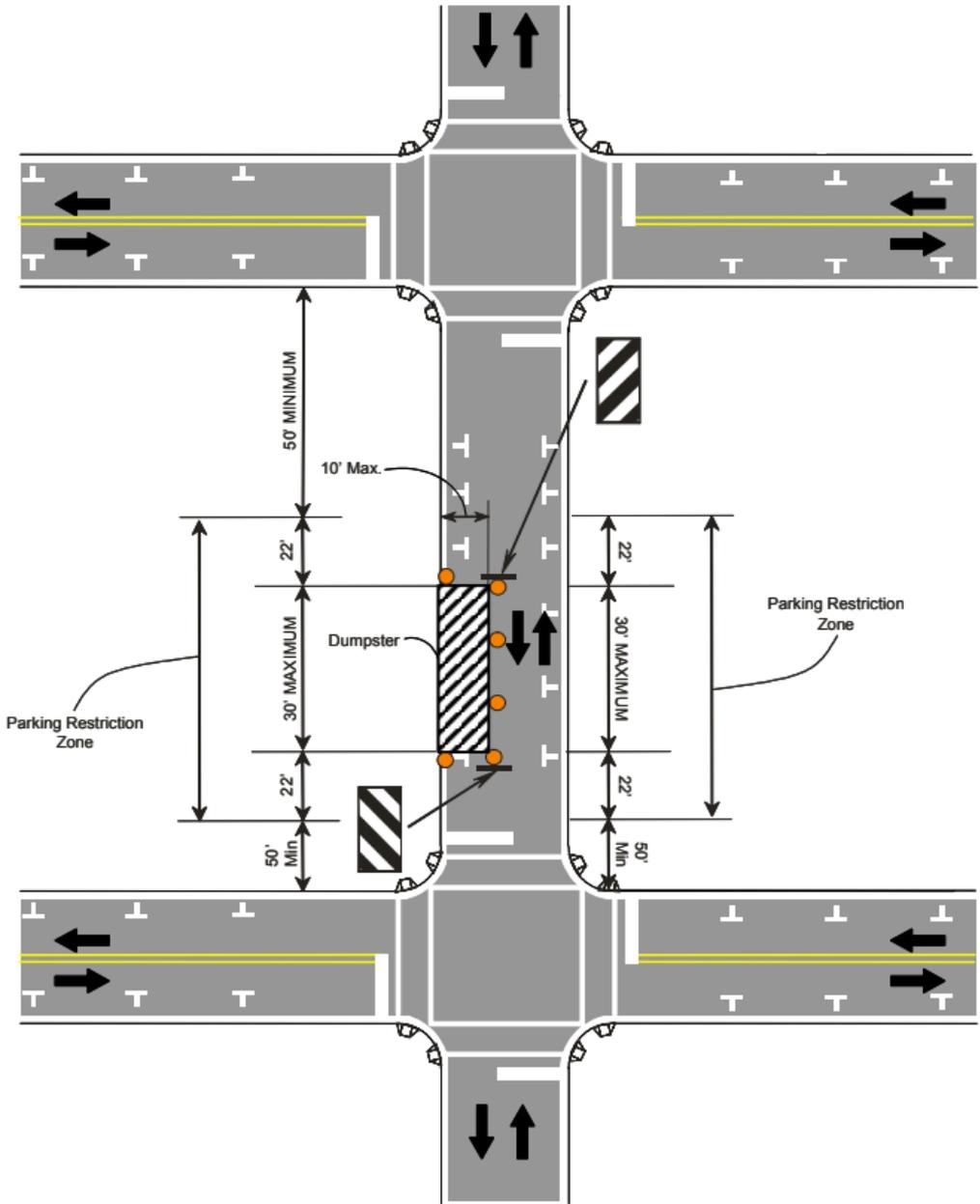
69



**Typical Application: Covered Pedestrian Walkways—
Midblock Locations**



**Typical Application: Covered Pedestrian Walkways—
Corner Locations at Four-Way Intersections**



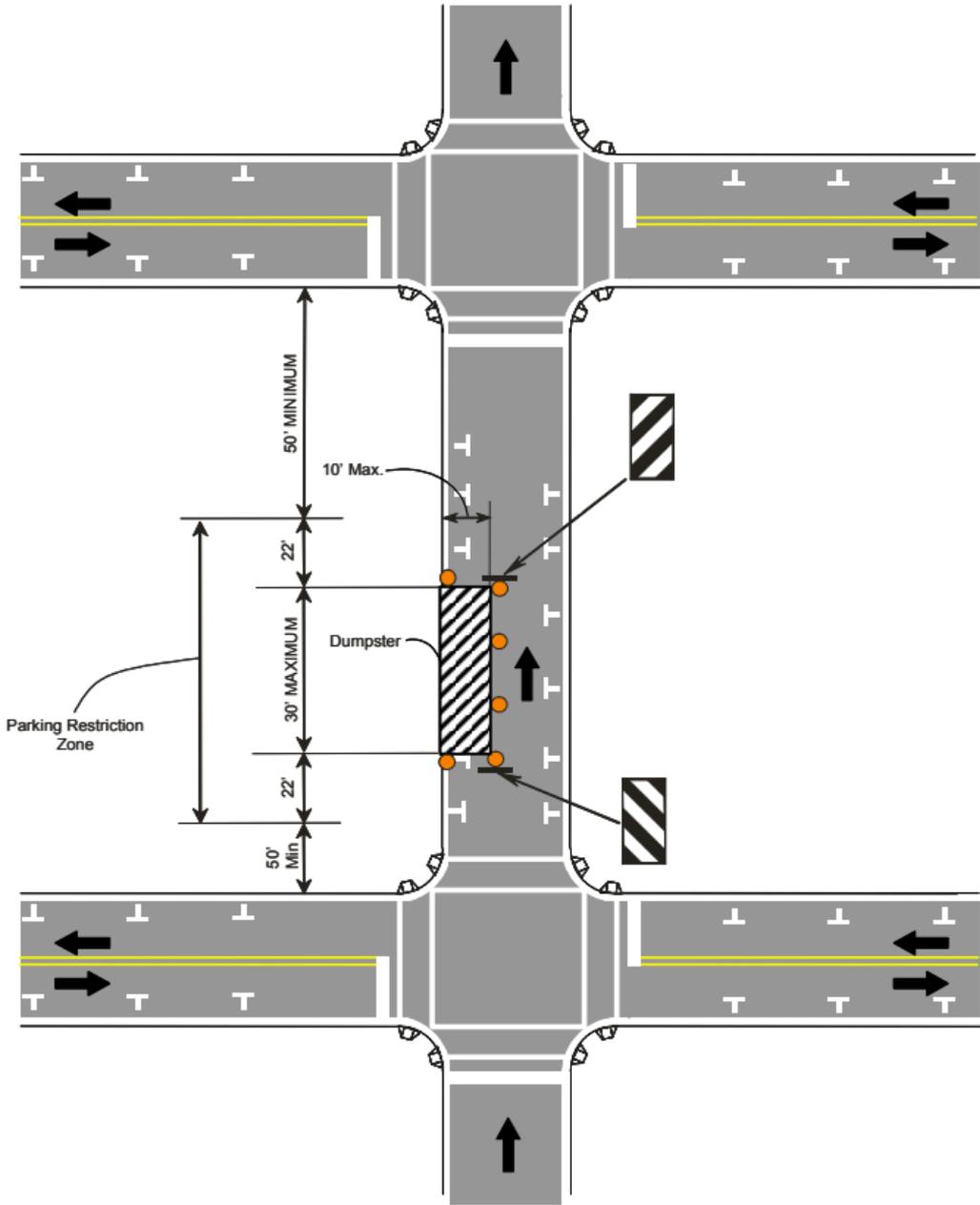
Typical Application: Construction Dumpster Located in Parking Lane

Notes for Figure

When placing a dumpster, it must be set back a minimum of 50 feet from the corner of both adjacent intersection approaches.

If a dumpster remains on the street for more than 14 days, approval for a dumpster permit must be granted by DDOT Traffic Services Administration.

Dumpsters are permitted on the main thoroughfares (commuter routes) from 9:30 AM – 3:00 PM and 10:00 PM – 5:00 AM ONLY. If the roadway is marked with NO STANDING / NO PARKING ANYTIME signs, dumpsters are not allowed any time.



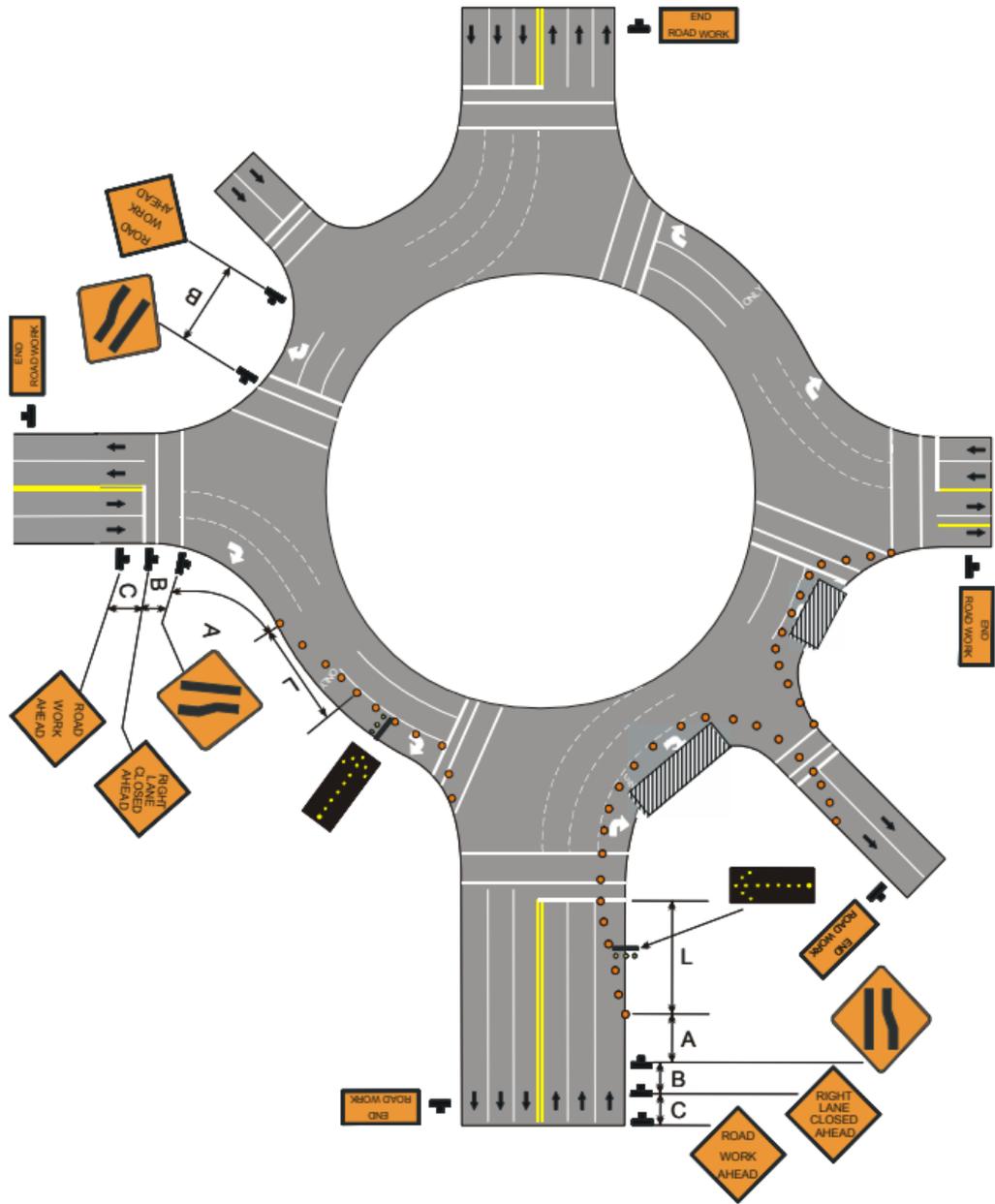
Typical Application: Construction Dumpster Located in Parking Lane (ONE-WAY Road)

Notes for Figure

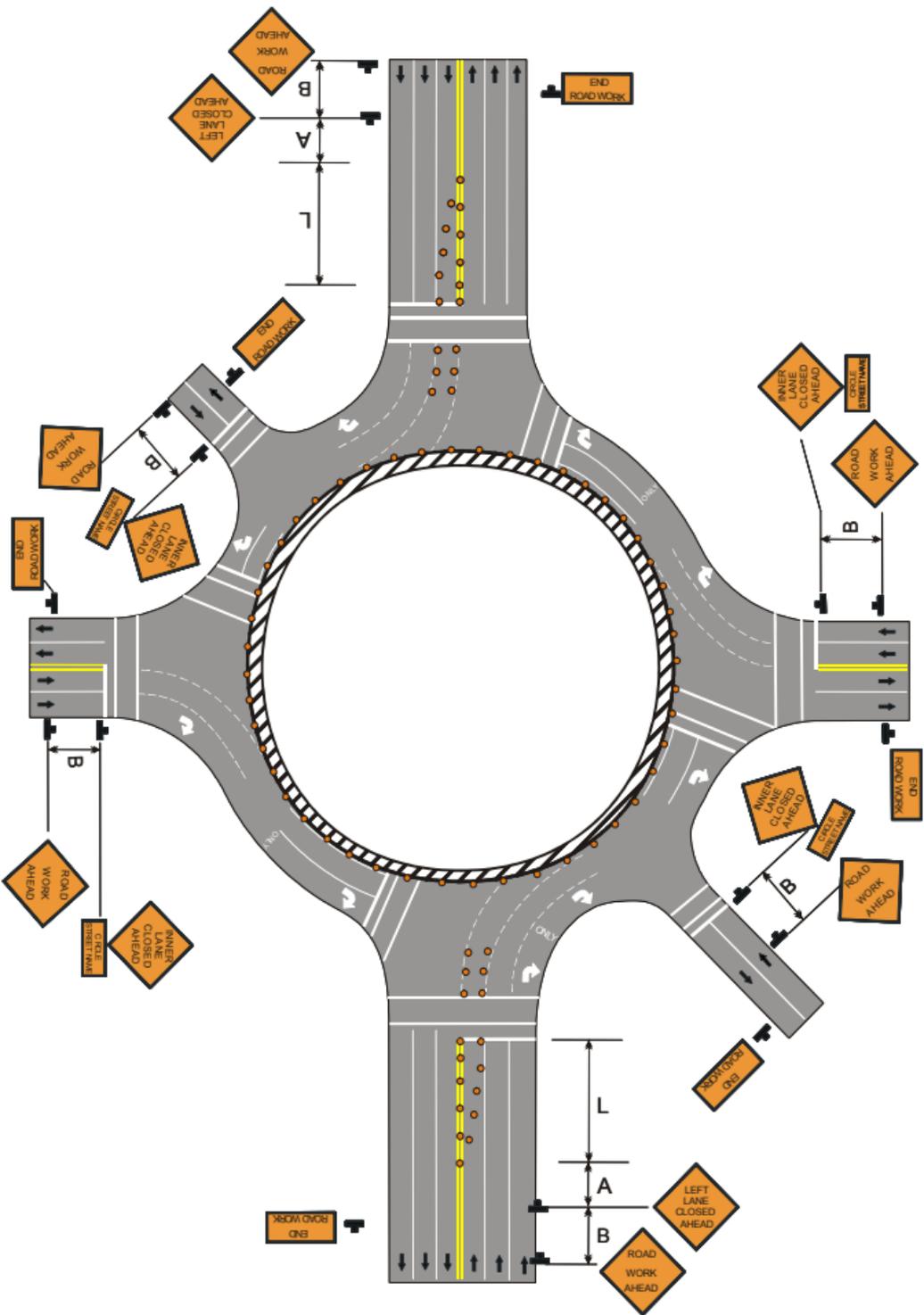
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If a dumpster remains on the street for more than 14 days, approval for a dumpster permit must be granted by DDOT Traffic Services Administration.

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Typical Application: Traffic Circle with Outer-most Lane Closure



Typical Application: Traffic Circle with Inner-Most Lane Closure

Acknowledgements

The guidelines and standards were developed in part by the Virginia Department of Transportation, the West Virginia Department of Highways, and the Wisconsin Department of Transportation. These guidelines have been modified by the District of Columbia Department of Transportation (DDOT) to meet DDOT's requirements for safety in temporary traffic control zones, especially in urban areas and was reviewed by the Work Zone and Public Safety Branch of DDOT.

Information and Training

For additional copies of this reference booklet, or for information on work zone safety and training, please contact the following agencies:

District Department of Transportation

Traffic Services Administration / Traffic Safety Division
Work Zone and Public Safety Branch
2000 14th Street, NW, 7th Floor
Washington, DC 20009
(202) 671-2710 (202) 671-0114 (fax)

Website: www.ddot.dc.gov

Email: ddot@dc.gov

To apply for permits, contact:

District Department of Transportation

Public Space Management Administration
941 North Capitol Street, 2nd Floor
Washington, DC 20002
(202) 535-2209 (202) 535-2221 (fax)



Prepared for:

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DISTRICT DEPARTMENT OF TRANSPORTATION